

RADIO CONTROL

47380

car action

THE WORLD'S LEADING RC CAR MAGAZINE

READY TO
RACE!

EXCLUSIVE!

Associated's
New RC10GT
Ready-to-Run



DYNO TESTED
Orion TOP Motor

TOTAL CONTROL

7 receivers
that deliver

FIRST LOOK
TRAXXAS T-MAXX

ProTrax Rustler RTR
Tamiya M-04L BMW Z3
OFNA Z-10 MKII



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February 2000



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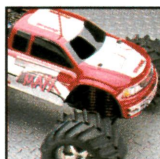


ON THE COVER (from top): Associated's RC10GT Ready-To-Run digs in (photo by Steve Pond); the Traxxas T-Maxx catches some air (photo by Walter Sidas).

RC has never been easier

It's true; the radio control car hobby is more accessible than ever, thanks to the wide variety of partially assembled kits, "almost ready to run" models and truly ready-to-run (RTR) machines that are available today. This month, we look at RTR vehicles that represent the best of the genre.

The **Traxxas T-Maxx** really needs no introduction; this monster machine has generated quite a lot of buzz based on advertising and word of mouth, but most people don't realize that the truck will be sold completely assembled. Its many innovative features overshadow that fact, but it's an important facet. Yes; the RTR aspect means consumers won't have to build the truck, but consider the bigger picture: the T-Maxx is a complex piece of machinery that traditionally would be offered in kit form only. For Traxxas, RTRs are not just for beginners but for enthusiasts of all skill levels.



Speaking of winning, that's a feat RTR vehicles aren't supposed to be capable of, and that's



my cue to introduce the next ground-breaking RTR featured in this issue. The **Associated RC10GT RTR** is ready to enter your local track's 1/10 nitro-truck class as soon as you open the box.

Even if you're not interested in racing, nothing beats the fun and pleasure of operating a vehicle that could be run on a racetrack. If it handles there, it will handle anywhere.

Of course, ready-to-run isn't the only "big thing" happening in RC!

This month, we put the hottest touring car through its paces, as the

G-Man takes the wheel of the **Associated TC3**; Chris

Chianelli reveals what really went down at the **Kyosho World**



Cup in Hawaii (Chris scams all the cool trips); and, if you're into RC trucks and have a soft spot for the big rigs, you'll be glad to know that the **"4x4" column** introduced in this issue will be appearing in every issue!

Until next time,

Peter Vieira

Peter Vieira
Executive Editor

RADIO CONTROL car action

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More "Project Car" Questions ...

I was thinking about building an RC dragster from the Bolink Econorail kit when I saw the car in the December '99 issue. It looks as though you stretched the dragster's wheelbase and added some type of rod to stiffen the back half of the chassis, but the article did not mention it. Please tell me how this modification was done, including the materials used. [email]
ROYCE CHESSER



Hey Pete, loved the wide-track Tamiya F-150; I would like to make my truck wide, too. Do you have any directions on how to go from stock to wide-track? Is there any way to change the molded camber links to turnbuckles? [email]
NATE GREENING

I really like the Tamiya wide-track project truck. Tamiya should have built it that way in the first place! I see the car has a graphite chassis, but you don't mention it in the parts list. Is it available?
MARTY BRUCE
Oakfield, NY

Royce, nope, no mods; as for the wheelbase and the torque rod, the chassis arrives just the way you see it. The only non-stock parts on the chassis are the Du-Bro linkages (the kit includes wire links, which I lost!), the Trinity anodized screws and the blue wing mounts from Speedmerchant.

Nate, I don't have any directions, but assembly is simple: all you

really have to do is replace "short" pieces with "long" ones from the Tamiya Blazing Star kit. If you really need instructions, order the Blazing Star assembly manual.

Now, about those camber links: to keep things simple, I stuck with the molded upper links. Unfortunately, you can't simply bolt in pivot balls and make up turnbuckle links. This is because the inboard side of the stock links do not snap over a ball end; instead, they use pivot screws that pass through the shock tower, and the hole is too big to accept a pivot ball. If you want the turnbuckles only for the "cool" factor, I don't think they're worth the trouble. The molded links are bombproof, and the truck looks plenty trick with them.

Marty, how could I forget the graphite chassis? It's part no. 53195, but that only gets you the plates. To install them, you have to buy the FRP chassis kit (no. 53166). The FRP kit includes the molded pieces and hardware you need to install the graphite plates. This setup will fit any TA02 or TA02FF chassis (it will fit a TA01 as well, but the wheelbase will be shorter).
—Pete

... And an Idea

I just received the latest issue of *Radio Control Car Action* and turned right to the "Project Gallery" article. This is a wonderful new idea; I especially like the fact that you used less expensive cars, such as the Traxxas buggy and Bolink dragster, for your projects. Too often, I feel these low-budget (but high-fun) cars are passed over for hop-up articles in favor of more expensive, high-performance cars.

In response to your request for new project ideas, I suggest the Team Losi Junior T. This happens to be the truck I own, and I think it is one of the best trucks for beginners. Unfortunately, manufacturers don't make hop-up parts for it. I have written to many companies looking for parts for my Junior T, but they all say they don't have any. I have already added complete bearings, an ESC and a competition stock motor, but I would

like to add blue screws, a slipper, titanium turnbuckles and anything graphite. You could do an interesting article on retrofitting graphite goodies and other parts to form a SUPER T! [email]
CHRIS JOCHEM

Glad you liked the article, Chris! We definitely had fun building those cars, and you're right: you don't need to start with an expensive car to build a cool project machine. You're also right about the Junior T; it's a genuine RC classic. I did a little research for you on hop-ups for it: Losi offers a slipper clutch to fit it (part no. A-3110), and Losi's titanium-nitride shock shafts will give you extra-smooth shock action (front shafts, no. 5060; rear, no. 5061). Your local hobby shop can help you get titanium turnbuckles from Lunsford or Factory Team and blue screws from Trinity; just take in your steel pieces so they'll be able to match the lengths. While you're at it, you can add RPM rod ends and Robinson Racing titanium ball studs for extra beef. RPM wheels would dress up your truck, too, and there are lots of race-worthy treads from Losi and Pro-Line that will keep you glued to the track—or street (Losi and Pro-Line have wild street treads for trucks, too). A "Street T" could be a cool project. Maybe we'll build one!
—Pete



Show Stuff

The stuff from the big hobby show looks awesome ("New for 2000," January '00 issue). I think the Tamiya Stadium Raider is cool. Does it have longer arms than a regular TL01? Is it for off-road or

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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Pete Vieira: peter@airage.com
Greg Vogel: gregv@airage.com

street? [email]
HARRISON COMPTON

The Stadium Raider uses the regular, narrow TL01 suspension arms, but it is wider than a TL01 touring car because of its deeply offset rims. Hard, spiked tires are included for off-road use, but you could easily mount a set of Pro-Line Road Rage buggy tires on the kit rims for street duty, or you could install any touring-car tire and wheel combination you like. Look for a test of the Stadium Raider soon; we'll explore some of those options.

Information Overload

I would like to know all the specifications and the price of the Serpent Vector. [email]
SCOTT SMITH

I am interested in the Tamiya Super Hornet; will you please send me information on it? [email]
BEN

I hear that HPI is bringing out a Nitro MT. When is it coming out and how much will it cost? [email]
JASON

Guys, we're always glad to help, but the best sources of the info you're after are the manufacturers. Since you emailed us, you're obviously using a computer that is linked to the Web. Hop onto www.rcyellowpages.com for a link to just about every RC company under the sun—including Serpent, Tamiya and HPI. If their websites don't contain the information you need, phone them! We're sure they will be more than happy to answer your questions or to send you brochures about their products.
—Greg ■



BY CHRIS
CHIANELLI

Yokomo MR-4TC Pro **Yoko mo' performance**

This hot-rodded version of Yoko's popular "sport" tourer is packed with good stuff, including a full run of molded-graphite parts, a new chassis-mounted motor heat sink and all this stuff:

- Lunsford titanium turnbuckles
- Aluminum shocks
- Tuned springs
- MIP CVD axles
- Low-friction belts
- New one-piece upper deck

The stock MR-4TC already has a rep as a race-ready kit (somebody forgot to tell Yokomo that "sport" cars are supposed to be for play), so the Pro version should rock. Go bug your dealer; he should have them by now.

Yokomo USA, Airport Business Center, 17951 Skypark Cir., Ste. K, Irvine, CA 92614; (949) 252-8663; fax (949) 252-8657; www.yokomousa.com.



HOT ALLOY for your Associated GT

GPM Aluminum transmission case
and shock tower for the RC10GT

If it's anodized wow factor you're after, these are the parts to add to your GT. The deep blue finish looks nice, but it takes more than blue to get a second look these days; GPM adds the extra touch of the "silver lining" treatment that creates polished accents of natural aluminum for an eye-catching look. And even if you're colorblind, the machined-in "GT" on the rear shock collar will definitely get your attention. The gearbox and shock tower are direct bolt-ons and feature Associated factory geometry.

Hobby Etc., 90 West Pearl St., Nashua, NH 03063; (603) 595-8549; fax (603) 595-1498.

HOOP DREAMS

RPM Avenger and Chicane Wheels

RPM's wide variety of brightly chromed "street" rims for touring cars are now joined by a pair of racier-looking wheels that combine matte-finish spokes with polished rims. The Chicane (left) and Avenger (right) include 2mm spacers to ensure a perfect fit with your car's body and, like all RPM plated wheels, the tire-bonding areas aren't plated, so your tires will stay stuck.

RPM Inc., 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.



BIG-TIME FG Modellsport Porsche GT-1



Fifth-scale RC is really getting big (wow! Was that a lame pun or what?!!) This Porsche GT-1 is mounted on a standard FG 1/5 racing chassis. The new body style is modeled after the Porsche GT-1 car raced at last year's 24 Hours of Le Mans. In Europe and the United States, the FG car is one of the most popular chassis in 1/5 racing; with features such as a Zenoah 99 or Solo engine, double-A-arm independent suspension and an optional 4-wheel, disc-brake system, it's easy to see why.

SEI Racing, 14836 NE 31st Cir., Redmond, WA 98052; (425) 556-9090; fax (425) 556-9292.

This little tool made me smile, so it's in the "Scoop." It is powered by a motor from Tamiya's Mini 4WD line of free-running fantasy cars and is sold as a snap-together kit. I like it for its novelty value, but it's actually a good little tool! For small jobs such as drilling pilot holes in plastic and cleaning out hinge-pin bores, it's great.

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; fax (949) 362-2250; www.tamiya.com.

TAMIYA HANDY DRILL



Cool
Tool!

Die-Cast Cars go RC! Racing Champions radio control stockers

As a child, I can vividly remember getting amped up on Count Chocula then assembling huge track layouts for my die-cast cars. I'd spend hours plugging together banked turns, loops, jumps—all kinds of crazy stuff. Of course, when RC came along, I jumped in with both feet, but I still have a soft spot for the little cars. Now RC meets die-cast with Racing Champions tiny RC stock cars. A pit-box-shaped transmitter gives forward/reverse control, and the pit-row charging stand "gasses up" the car while playing authentic wheel-changing sounds and crew chatter. The car itself is a nicely detailed NASCAR replica. Pretty neat.

Racing Champions, 900 Roosevelt Rd., Building C, Ste. 320, Glen Ellyn, IL; (630) 790-3507; www.racingchampions.com.



Sticky Stuff

Now Available, The Same
Glue Brian Uses To Put
His Multi-Stage Inserts
Together And To Glue His
Tires To The Rim!



TK3701 Bead Loc Thick
Slow Drying, \$7.50

TK3700 Bead Loc Thin
Fast Drying, \$7.50

TK3504 The Bomb
Insert Glue, \$7.50

www.teamtrinity.com

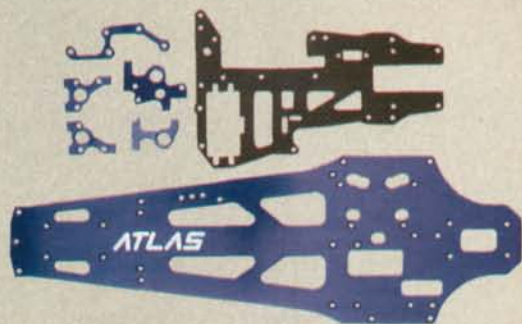
TEAM Kinwald TRINITY

Spider stiffer-upper

Atlas chassis set for Kyosho GP Spider MkII

The mythical figure "Atlas" carried the world on his back. This Atlas chassis can't match that feat, but it is definitely stronger than the stock Spider chassis! The Atlas setup is nicely anodized and fully countersunk, and it wears a machined-in Atlas logo. A graphite upper deck is included, as are jewel-like machined bulkheads and braces. All the hardware you'll need is also there.

Ultimate Hobbies, 2378 N. Orange Mall, Orange, CA 92665; (714) 921-0322; fax (714) 921-0380.



NEW WAYS TO CUT CARPET



SpeedMerchant Rev.3 and SpeedSpec direct-drive tourer

The new Rev.3 racing chassis features the same four-across battery setup as the Rev.2 but now incorporates a separate tray for the batteries. The tray's mounting screws are offset, and that allows you to remove and reposition the tray to move the cells forward or backward by 1/4 inch. Other familiar Rev-series features include O-ring battery hold-downs ("Tape and scissors are for Christmas presents," says SpeedMerchant), double damper tubes and "Speed Tune" adjustable rear suspension. Check out the old-style front end—updated with trick, aluminum-insert braces. SpeedMerchant likes this setup because it is lighter, more consistent and less prone to being tweaked in a crash.

The SpeedSpec car is also a 4-cell job but is meant to wear a sedan body. Not much info yet on this direct-drive tourer, but as you can see, it has many Rev-series features and scads of room for electronics. Four cells may seem a bit anemic for 1/8 scale, but it's actually plenty of horsepower for the typical indoor carpet track.

SpeedMerchant, distributed by Hobby Etc. Inc., 90 West Pearl St., Nashua, NH 03060; (603) 595-8549; fax (603) 595-1498.



a la TEAM Kinwald

TK5008	Blue Aluminum Battery Strap	\$19.99
TK5009	Blue Aluminum Lower Front Bulkhead	\$29.99
TK5010	Blue Aluminum Upper Servo Brace	\$29.99
TK5011	Blue Aluminum Rear Body Mounts, 1 Pair	\$17.99
TK5012	Blue Metal Flake Graphite Front Shock Tower	\$15.99
TK5013	Black Kydex Transponder Mount	\$2.99
TK5014	Blue Aluminum Shock Bushings, Front And Rear	\$7.99
TK5015	Blue Aluminum 0 Degree Rear Pivot Blocks	\$29.99
TK5016	Blue Aluminum 2 Degree Rear Pivot Blocks	\$29.99
TK5017	Blue Aluminum Servo Mounts, 1 Pair	\$19.99
TK5018	Blue Front Brace With Sway Bar Mount	\$11.99
	Front suspension brace with slot that fits XX front sway bar wire.	
TK5019	Blue Adjustable Rear Sway Bar Mounts	\$14.99
	Uses Losi sway bar wires. Adjustable to easily change wire length to fine tune your handling without changing the wire diameter.	
TK5020	One Piece Rear Wing Clip, 3 Pieces	\$4.99
	Special long blue clip that goes through both the rear wing mounting posts.	
TK5022	Blue Aluminum Motor Plate, Same As In Kit	\$10.99
TK5023	Blue Aluminum Heatsink Motor Plate	\$25.99
TK5024	Blue Aluminum Screw Kit	\$18.99
TK5025	Blue Aluminum Axle Bearing Spacers, 4 Pieces	\$9.99
TK5026	Blue Aluminum Rear Arm Brace	\$8.99
TK5027	Blue Aluminum Slipper/Shock Wrench	\$21.99
	Allows slipper adjustments without removing the rear tire. Tightens shock mounting nuts without scratching shock body.	
TK5028	Blue Titanium Tie Rod Set	\$26.99

TRINITY

www.teamtrinity.com

february 2000 29

RESISTANCE IS FUTILE!

Apex Internal Resistance Meter

Apex claims this interesting device can help you compare battery capacities by measuring their internal resistance, so you'll be able to select the best cells more quickly from a batch for matching. Features include:

- Selective ohm range for different applications.
- Ability to measure individual cells and packs of up to 30 cells.
- Can be used to measure resistance of wires, chargers, motors and even speed controls.



Also new from Apex is the Delta Plus peak charger/discharger. This compact unit is reverse-polarity protected and can peak-charge packs with up to 9 cells. It also has a 1A discharge capability and includes the compact Apex SPS V12 power supply for AC operation.

Magma Intl., 18 Crown Steel Dr., Ste. 107, Markham, Ontario, Canada L3R 9X8; (905) 305-9753.



Race-winning secrets revealed

Hobby Shack's 120-minute video "Speed Secrets of the Pros Revealed" is now available. This video features live segments from Hobby Shack's Expo '99 event, which took place in the parking lot of their Rancho Cucamonga, CA, store. The included workshops cover subjects such as Motor Choice and Maintenance by Team Trinity, Battery Maintenance and Handling from Peak Performance, Driving Tips from Team Associated and other segments from Team Novak, Team HPI, Pro-Line, Hitec and Traxxas. I've viewed this tape and feel it would be a very valuable reference source for any serious racer's video library. Oh, yeah; the price is right, too!

Global Hobbies, 18480 Bandilier Circle, Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.



GET MORE RUNS FROM YOUR RADIO

No Mercy 1300mAh NiMH AA Battery

Get medieval on anemic Ni-Cds with these long-lasting NiMH cells from No Mercy. These AAs have more than twice the capacity of the

600mAh yellow cells that are probably in your radio right now!

Magma Intl., 18 Crown Steel Dr., Ste. 107, Markham, Ontario, Canada L3R 9X8; (905) 305-9753.



You can increase the rigidity and adjustability of your MR-4TC with this kit from Penguin R/C (no relation to the super villain). A hook-and-loop battery strap keeps your cells in the battery slots, and the kit even includes graphite shock towers

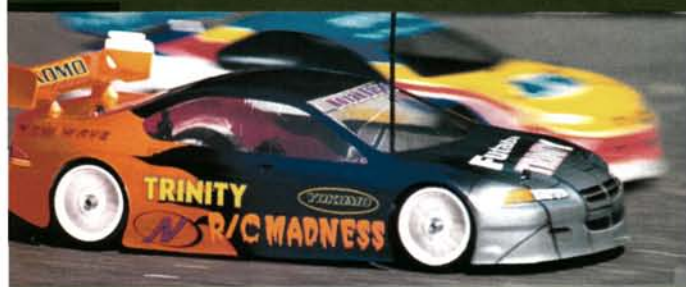
PENGUINS CAN FLY!



Penguin R/C Graphite Chassis Kit for Yokomo MR-4TC

that offer three additional shock positions and seven roll-center (inboard camber position) options. All the parts are of very high quality, and all the required hardware is included.

Penguin R/C, 1230-P N. Jefferson St., Anaheim, CA 92807; (714) 630-9015; fax (714) 630-6250. ■



Win a \$500 gift certificate from DuraTrax! Send a sharp, uncluttered, well-exposed color photo of your vehicle (no Polaroids), and a brief description, to Readers' Rides, RC Car Action, 100 East Ridge, Ridgefield, CT 06877-4606 USA. If we publish your photo, you'll receive a free RC Car Action decal sheet and will be eligible to win a \$500 gift certificate from DuraTrax in the "Readers' Rides of the Year Contest." Write your address and phone number on your letter and on the back of every photo you send. Good luck!

Readers' Rides

Jason Fernando HPI RS4 Nitro

Jason Fernando of Anchorage, AK, powers his HPI racecar with an O.S. CVX .15 nitro engine, and he controls it using a Futaba Magnum Junior radio and Futaba servos. Among its many features are MIP's Stinger tuned pipe and header, MIP boost bottle, HPI countersunk chassis, Pro belted slicks with Pro molded inserts, HPI 13/20 clutch bell, Kyosho special clutch, Kyosho receiver protector and a 2-speed tranny. Graphite parts include front and rear shock towers and upper deck.



Anthony Bidegain Yokomo MX4 and Associated RC10B3

Anthony shows off two of his race buggies before they hit the track at Aurora, IL. The Yokomo MX4 has an LRP V6 speed control, a Reedy Sonic 2 motor and Reedy Zappers batteries. It's controlled by a KO Propo radio and receiver. The Associated RC10B3 is powered by a Reedy Sonic 2 motor and is equipped with a Novak 610 HRV speed control.

James Miller Tamiya Peugeot 406 ST

James Miller of Southaven, MS, built this Tamiya Peugeot in only two days. He plans to use the stock RS540 motor "till it burns up." The green machine is equipped with a Hitec Lynx radio, ESC and a 1500 SCR battery pack. In his eight years of RC, he has built buggies, trucks, gas trucks and monster trucks. Not a bad résumé!



Brent Cooper Losi Double-X 'CR' and Yokomo YR-4M2 Pro

Californian Brent Cooper airbrushed the bodies on his vehicles himself. The Losi buggy has a Cyclone ESC and an XXL receiver from Novak. The Yokomo features a Novak Cyclone ESC, Peak Performance cells and a Paradox Pro motor. Both vehicles are steered via Airtronics 94257 servos.

Readers' Rides

Alex Tempka Tamiya Ford SVT Lightning

This Tamiya TLo1, owned by Alex Tempka of Alpharetta, GA, is powered by a Trinity D3 15-turn motor with Amp Max II 1500 batteries. The truck has a Rooster reversible ESC, a Cirrus Clear MG60 servo, RPM Invader wheels and RC Neon strips.



Nelson Lee Tamiya TA03F Pro

Nelson's Tamiya TA03F Pro now has specs to match the David Jun edition. Electronics include a GM V-12 ESC, Novak Polaris receiver, Futaba Magnum Junior radio and a Hitec servo. It's also equipped with a Tamiya carbon/graphite chassis and purple ball connectors, pulleys, countershafts, purple rear drive shafts, blue servo posts, motor mount heat sink, motor plate,

red wheel nuts, graphite stabilizer bar supports, colored stabilizer bars and springs and rear long axles, all from Tamiya. Topping it all off is a Tamiya Audi A4 body. The Valley Stream, NY, resident spent many days working on the body, which he finished with purple, white and true blue pearl paints.



Frank Logan Tamiya Juggernaut

Frank equipped his Juggernaut with a Python radio and metal-gear racing servo from JR, along with a Novak Super Rooster ESC. The decals and paint are also by Frank, who hails from Dartmouth, Nova Scotia. He says this is his first RC vehicle—looks like a good beginning!



Angelo Alessio Tamiya Chevy S-10 and HPI Nitro Mini RS4

Twelve-year-old Angelo is justly proud of his Tamiya Chevy S-10 truck, as well as its stablemate, an HPI Nitro Mini RS4. The Tamiya has full ball bearings, a Trinity 2000 battery pack, a Phantom stock motor and a Novak Explorer speed control. The Mini RS4 has a 2-speed transmission and will soon be given some more features: an MIP Stinger pipe, ball bearings and taller gears. Both cars "haul," says San Diego Angelo.

Pit Tips

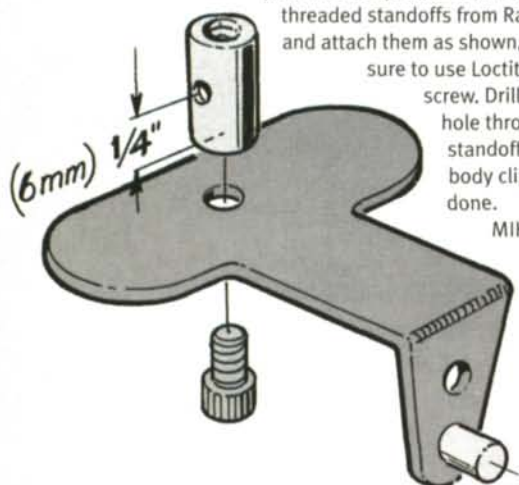
BY JIM NEWMAN

Radio Control Car Action will give a 6-month subscription (or an extension of your existing subscription) for each of your ideas used in "Pit Tips". Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.

Crashproof Body Mounts

To make crashproof rear body mounts for your RC10GT, purchase $\frac{1}{4}$ x $\frac{1}{2}$ -inch threaded standoffs from RadioShack and attach them as shown, making sure to use Loctite on the screw. Drill a $\frac{1}{16}$ -inch hole through the standoff for the body clip, and you're done.

MIKE REED
Yuma, AZ

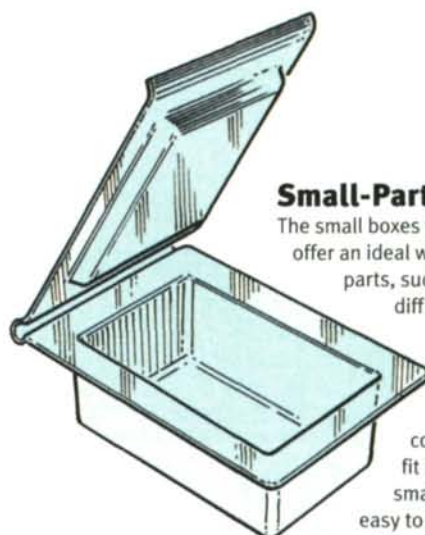


Small-Parts Storage

The small boxes that fuses are sold in offer an ideal way to carry other small parts, such as motor shims and diff balls, in your pit box.

Unlike compartmentalized containers, which don't allow you to "dump out" single compartments and do not fit in pit-box drawers, the small fuse containers are easy to stow and make it simple to retrieve the parts you need.

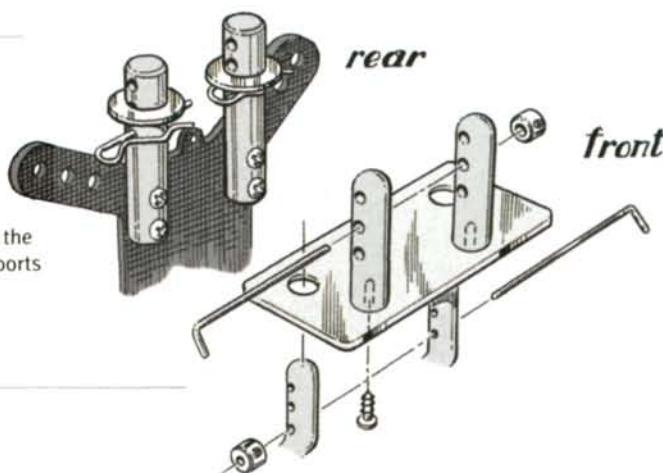
JOSEPH T. DOVE
Indianapolis, IN



Extended MT Body Posts

These body-post extenders allow almost any body to be mounted on the HPI RS4 MT chassis. For stability, drill extra holes beneath the existing holes in the rear shock tower. Up front, use a piece of scrap plastic or Kydex to form the "shelf" for the extender posts. The music-wire and screw-collar supports are handier than body clips.

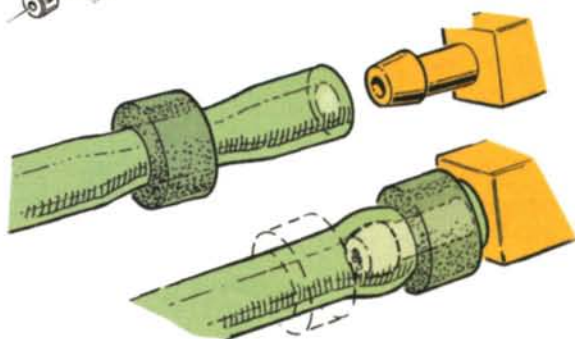
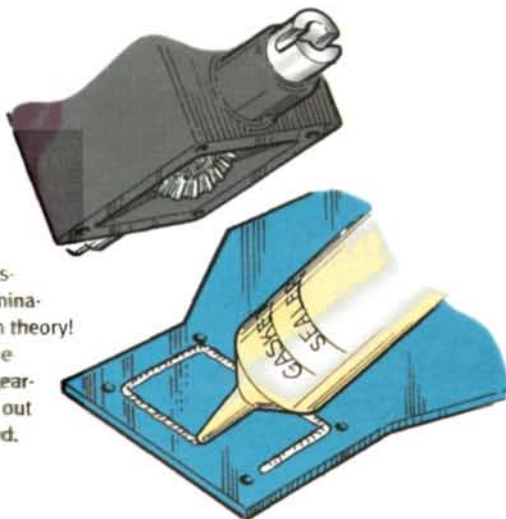
CURTIS BROOKS
North Las Vegas, NV



Dirt-Proof Gearbox

Many $\frac{1}{8}$ -scale buggies use an open-bottom gearbox design and rely on a close fit with the chassis to prevent contamination. Works great—in theory! Run a bead of silicone sealant around the gearbox opening to keep out grit and sand for good.

AARON DICKERSON
Syracuse, NY

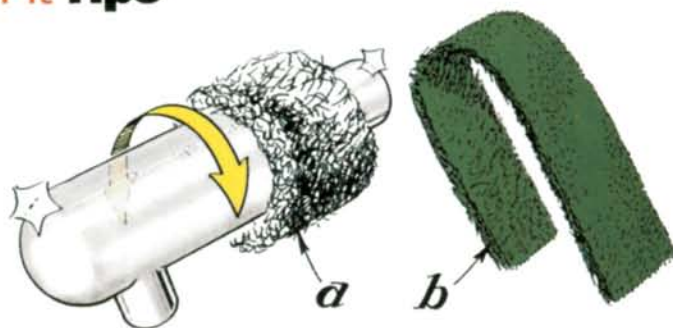


Tightly Fitting Fuel Tubing

To prevent fuel tubing from coming off a fitting, first slip an extra section of tubing over the fuel line.

BARRY LINCOLN
Orlando, FL

Pit Tips



Polished Pipes

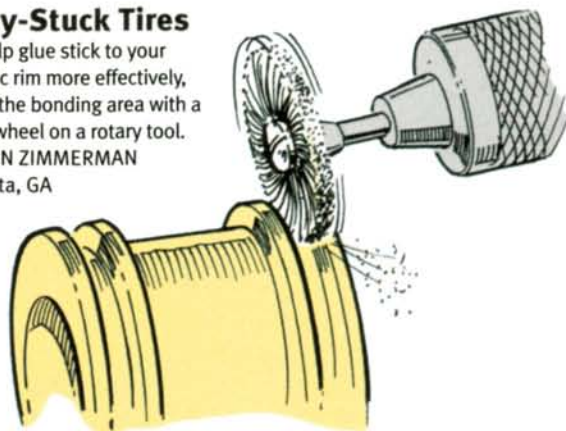
You can give dull aluminum pipes a chrome-like finish by polishing them with fine steel wool and chrome polish. You can also use a 3M Scotch-Brite pad in a "towel" motion to build a high shine.

JESSE WILLIAMS
Winston Salem, NC

Stay-Stuck Tires

To help glue stick to your plastic rim more effectively, scuff the bonding area with a wire wheel on a rotary tool.

GLENN ZIMMERMAN
Atlanta, GA



Button Replacement

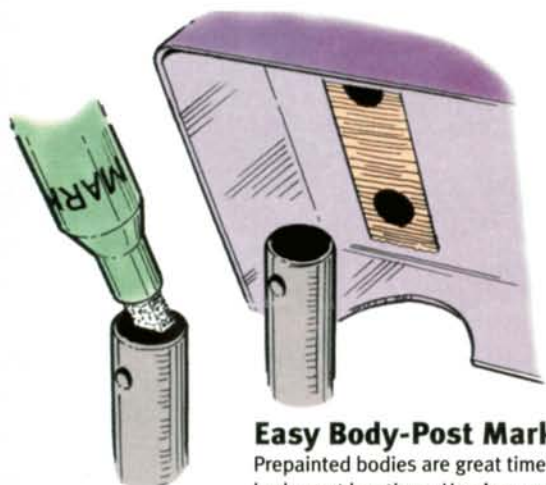
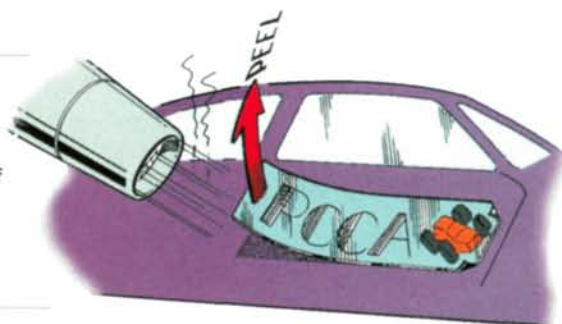
If the "button" on the end of your transmitter antenna falls off, just replace it with a screw collar. The small collars from carburetor linkages will be too small, but larger units are available in the model airplane section of your local hobby shop; aeromodelers use them to secure the wheels on their planes.

ERIK NIELSON
Midland, MI

Faster, Easier Decal Removal

When removing stickers from your Lexan body, use a hairdryer to soften the adhesive. Residue can be cleaned off the body with nitro fuel, which does not harm Lexan.

PETE WILLISHER
Woodbridge, CT



Easy Body-Post Marking

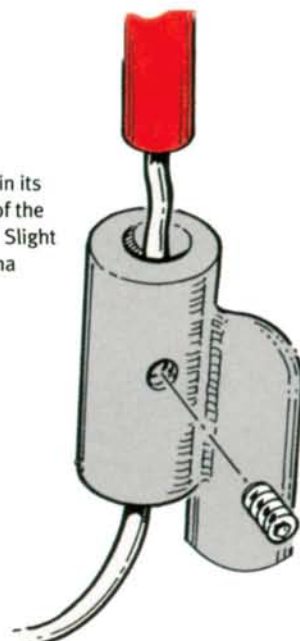
Prepainted bodies are great time-savers, but they make it difficult to mark the body-post locations. Here's an easy way to do it: color the tops of the body posts with a permanent marker, line up the wheel wells, then press the body down on the posts. If the inside of the body is painted black, first place a strip of masking tape across the body-post area so that the marks will be visible.

MIKE HOSKINS
Amarillo, TX

Loose Antenna Fix

If your antenna tube fits too loosely in its holder, drill a small hole in the side of the holder to accept a $\frac{1}{16}$ -inch setscrew. Slight tension is enough to hold the antenna securely.

LAWRENCE PARTRIDGE
Minneapolis, MN



Troubleshooting

BY PETER VIEIRA • ILLUSTRATIONS BY JIM NEWMAN

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at *Radio Control Car Action*, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

Dual-Motor Wiring Explained

I've been driving my Clod Buster in stock form for two years now, and I finally saved enough money to do some modifications, but I'm confused about the electrical system. Do I need to use multiple battery packs and an ESC to replace the mechanical speed control? Am I supposed to hook up the wires differently? I never really understood the way my Clod is wired for power, so this is very confusing. What should I do? [email]

HAROLD BAIN

The Clod Buster wiring harness was designed to run the motors in "parallel" (for greater speed, at the expense of run time), or in "series" (for greater run time, at the expense of speed). When the motors are wired in parallel, that means the battery's positive lead goes to both motors' positive tabs, and the negative lead goes to both motors' negative tabs. This setup will drain the battery twice as fast as a single motor, but there is no loss in rpm.

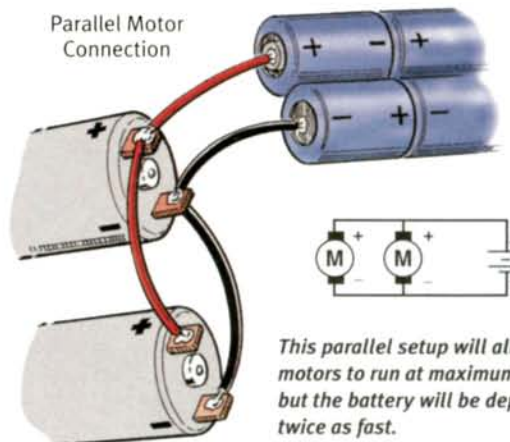
A series hookup connects the battery's positive lead to the one motor's positive tab, then joins that motor's negative tab to the second motor's positive tab. The battery's negative tab is then connected to the second motor's negative tab (the illustrations make this easy to understand). When wired in series, the motors will run at approximately half the speed of the parallel setup, but the battery will have about the same run time as it would with a single-motor setup.

That's the series/parallel story for motors; batteries can also be wired both ways, but with different results. Take a 6-cell, 2000mAh stick pack, for example. The cells are assembled end to end, positive to negative: that means they're hooked up in series. This "adds up" their voltage; each cell puts out 1.2 volts, so six of them assembled in series put out 7.2 volts. However, the cells' capacities (run times) are not "added up." Each cell is rated for 2000mAh, but that doesn't mean the 6 cells deliver 12000mAh; the pack's capacity is still 2000mAh. The reverse is true if the 6 cells are hooked up in parallel; the capacities would "add up" to deliver 12000mAh, but the total voltage of the pack would be 1.2 volts.

If you want to get maximum speed and run time from your Clod, you can install two battery packs wired in parallel (for double the run time) and wire the motors in parallel (so you don't sacrifice speed). This type of hookup isn't for every ESC, however; check for dual-motor compatibility before you buy. Novak's Super Rooster, the Tekin Titan, LRP's Bullet/F-1 Super Reverse and the Keyence Ao-7R/Rz can handle it (others may as well; again, check those specs). You'll need to do some custom soldering to get everything hooked up properly; if you aren't comfortable with that, ask your hobby shop for help.

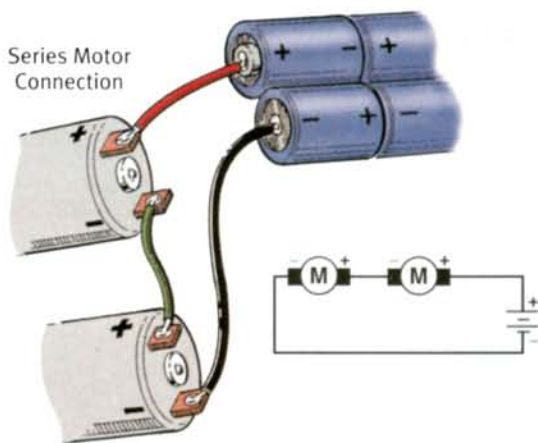
One final note: if you install aftermarket mod motors, be sure the rear motor is hooked up in reverse; see the new "4 x 4" column in this issue for details.

Parallel Motor Connection



This parallel setup will allow the motors to run at maximum rpm, but the battery will be depleted twice as fast.

Series Motor Connection

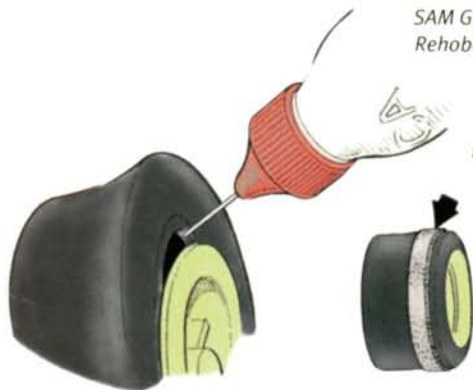


Wired in series, the motors will run at approximately half the speed of the parallel setup shown above, but the battery will last twice as long (in a perfect world). For the sake of clarity, an ESC is not shown. Do not wire your batteries directly to the motors!

Glue-and-Forget Tires

I am the worst tire-gluer in the world. I've tried all the name-brand CAs, but they don't seem to bond, no matter how much I apply. How do I get my tires to stick?

SAM GEPARD
Rehoboth, MA



Cyanoacrylate (CA) glue requires a precise fit between clean parts to bond properly, so be sure to thoroughly clean the bonding areas of the rim and the tire with denatured alcohol or motor spray, and test-fit the tire before you apply any glue. Some tires have a bead (the mounting area) that is too wide to properly fit between the flanges of the rim; trim the tire with scissors, if necessary. With the tire properly dry-mounted, you can start pulling back at the bead in sections and applying a drop of CA every inch or so. It's also important to remember that adding more CA will not strengthen a bond. The less you use, the better; that's why bottles of CA have those one-drop-at-a-time tips.

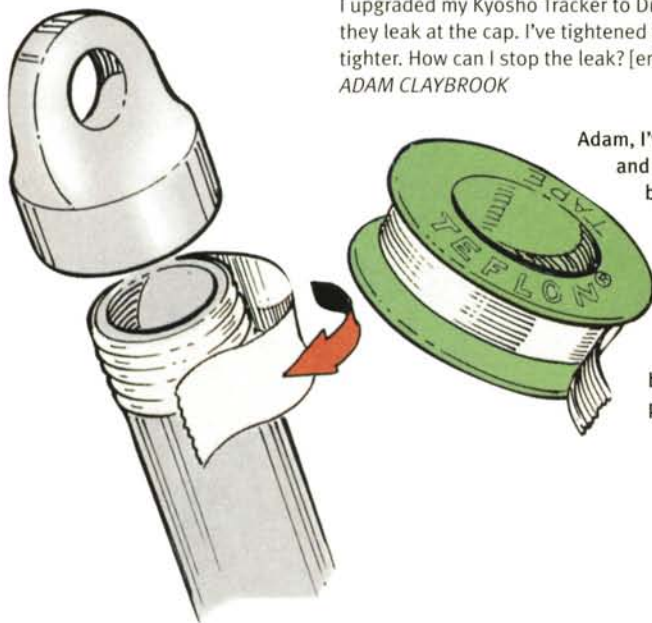
When you have tacked the tire into place, put a drop of CA on the tire/rim joint, and slowly rotate the wheel so the drop spreads evenly around the joint. You may need to flex the tire just slightly to draw the CA into the joint. Last, place a thick rubber band around the circumference of the tire close to the side that has been glued, and let the assembly sit while you repeat the procedure on the other tires. Do one side at a time; by the time you've finished one side of the fourth tire, the first tire will be dry enough to handle, so you can glue the other side.

Troubleshooting

Leaky Shock Fix: Tape it!

I upgraded my Kyosho Tracker to DuraTrax Competition Shocks (the gold ones). They look cool, but they leak at the cap. I've tightened them as much as I can; I'm afraid I'll strip them if I go any tighter. How can I stop the leak? [email]

ADAM CLAYBROOK



Adam, I've seen this occasional problem with DuraTrax shocks before, and the culprit is the volume-compensation bladder that fits between the cap and the shock body. First, be sure it's installed properly: the dome side should face into the shock body. If it is installed correctly but the shocks still leak, try using the bladder from your truck's plastic shocks; in my experience, the Kyosho bladders are a little deeper and softer and seal better. Still leaking? Hit the hardware store for a roll of Teflon plumbing tape, and wrap a strip around the shock-body threads (clockwise). This stuff is used to seal threaded plumbing fixtures, and it will definitely seal your shocks.

Unequaled Precision

Absolute Series Spurs



Available in 48P in 80T thru 91T, this is the quietest spur you can buy! RRP 1780 - RRP 1791

B3 / T3 Lite Aluminum Outdrives



Blue anodized and 40% lighter than stock ball diff outdrives. RRP 1502

Absolute Series Pinons



Available in 48P in 16T thru 28T sizes. Super hard, lightened and cut unmatched precision. Great with any spur, but with an Absolute spur, even on-off noise is gone! RRP 1416 - RRP 1428.

Unsurpassed Reliability

Outstanding Performance

Associated Blue Lightened Slipper Kit



The rear plate is hard anodized to reduce wear and the front plate is color treated. The front plate is designed to hold the slipper pad forcing the pad to slip on the rear plate. When pad shows sign of wear just flip it over for a new surface. Metal parts are CNC machined for a flawless fit. RRP 1515

RC10-GT Gas Spurs



Super tough and precision machined from heat-resistant plastic, these spurs mesh flawlessly with our Clutch Bells. 32P spurs in 54T thru 67T, RRP 2261 - RRP 2267, and 32P bells in 14T (New) thru 24T, RRP 2214 - RRP 2224.

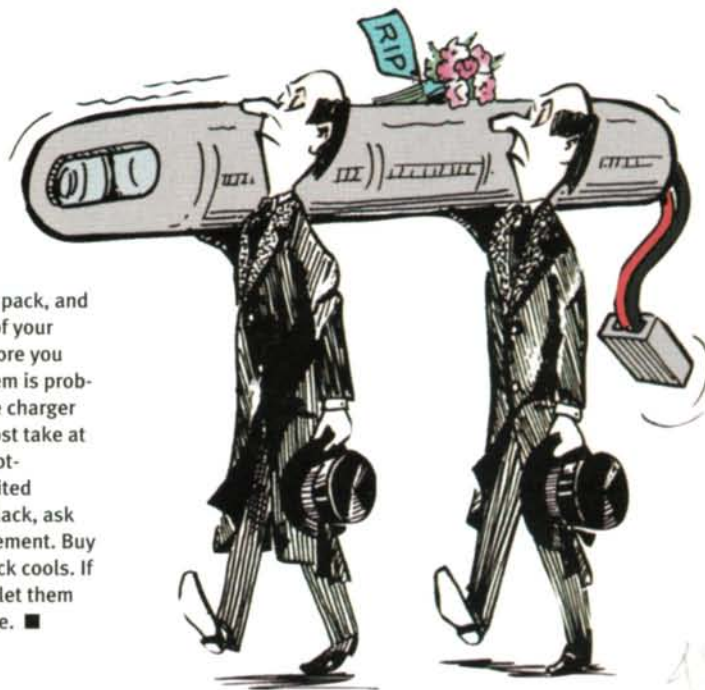
Is it Really Dead?

I'm having trouble with my battery pack—a 1400 stick pack that came with my Kyosho Tracker about a year ago. I charge it with a mechanical charger, and I always run it down completely before I recharge it. Lately, it only seems to run for about 1½ minutes after a charge. Do I need to replace it?

ADAM WESTON

Calgary, Alberta, Canada

I think your pack has had it, Adam. It sounds as if this is your only pack, and I bet you put it right back on the charger the second it comes out of your truck. That's the first no-no; you should always let a pack cool before you recharge it, or better yet, let it "rest" overnight. The second problem is probably under-charging. I've never seen a mechanical, 15-minute-type charger that could charge a pack fully with one twist of the timer knob; most take at least two. After a year of under-charging, deep discharging, and hot-charging, the cells in the pack have "learned" to accept only a limited charge. I would take the pack to your local hobby shop or RadioShack, ask them to put it into their Ni-Cd recycling bin, and then buy a replacement. Buy two extras so that you'll be able to keep running while the first pack cools. If you charge your packs until they are warm—toasty; not hot—and let them cool before you recharge them, they should deliver years of service. ■



Superb Quality

RC10-GT Steel Combo



Precision machined one-at-a-time from a single piece of steel and then hardened this 65T spur and 15T bell combo will last and last. The extra-hardened clutch bell fits ALL Associated and MIP shoes. RRP 2365

Associated Titanium Stealth Top Shaft



CNC Machined from a single piece of titanium, this super hard, super light top shaft will fit any Stealth transmission. No serious racer should do without this part. RRP 1512.

Intelligent Innovation

RC10-GT Hardened Steel Idler Gear



Cut from solid steel stock, this gear is lightened and then hardened for super quiet precision and extra long life. Jamin' tranny grease is included. RRP 2213

Thoughtful Design

RC10-GT Hardened Diff Gear



Hard anodized, precision machined aluminum diff gear. RRP 1513



1999 World Cup and National Champion

"I only care about performance, and that's why I run Robinson Racing gears and slipper clutches exclusively."

— Richard Saxton



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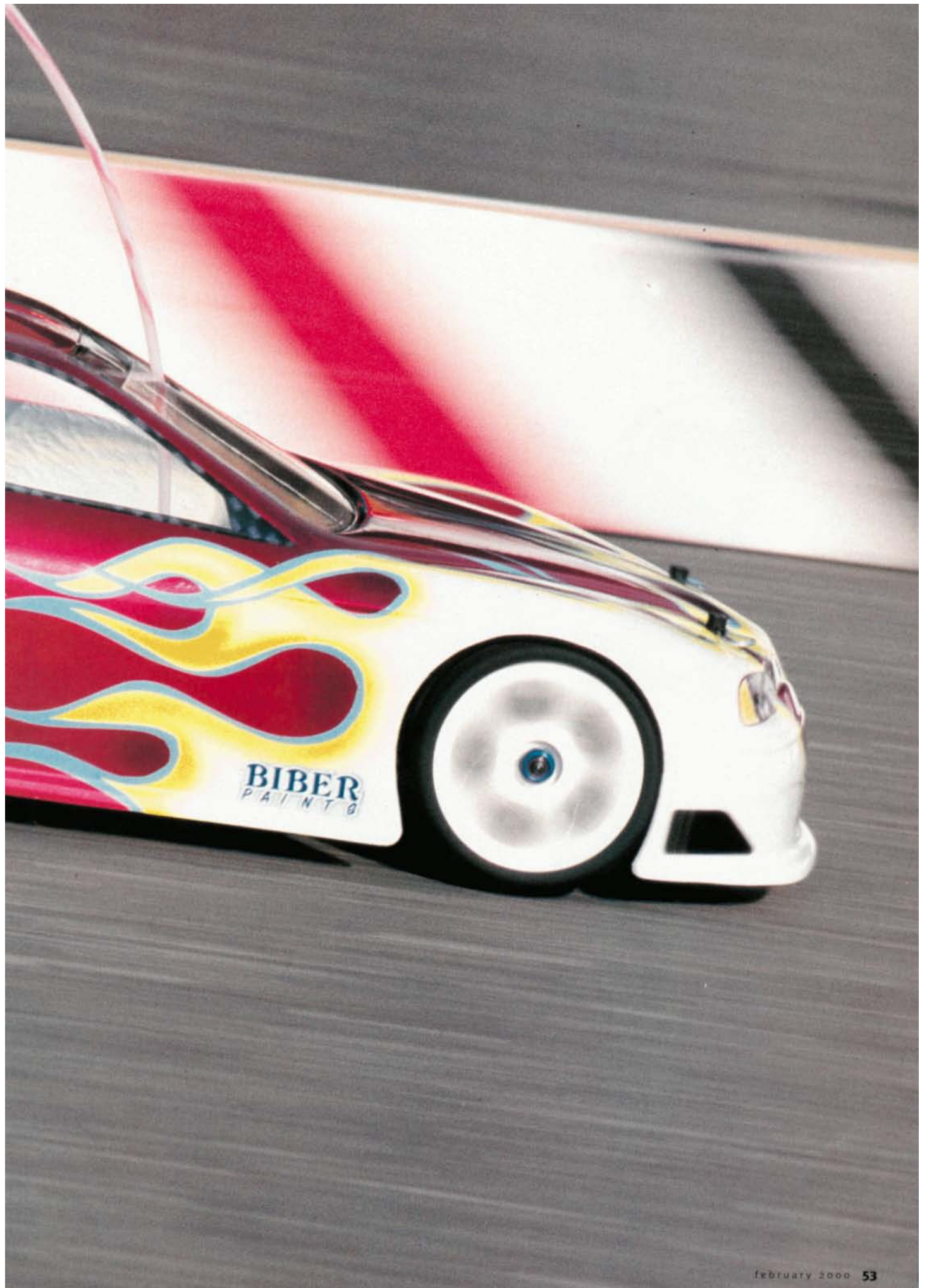


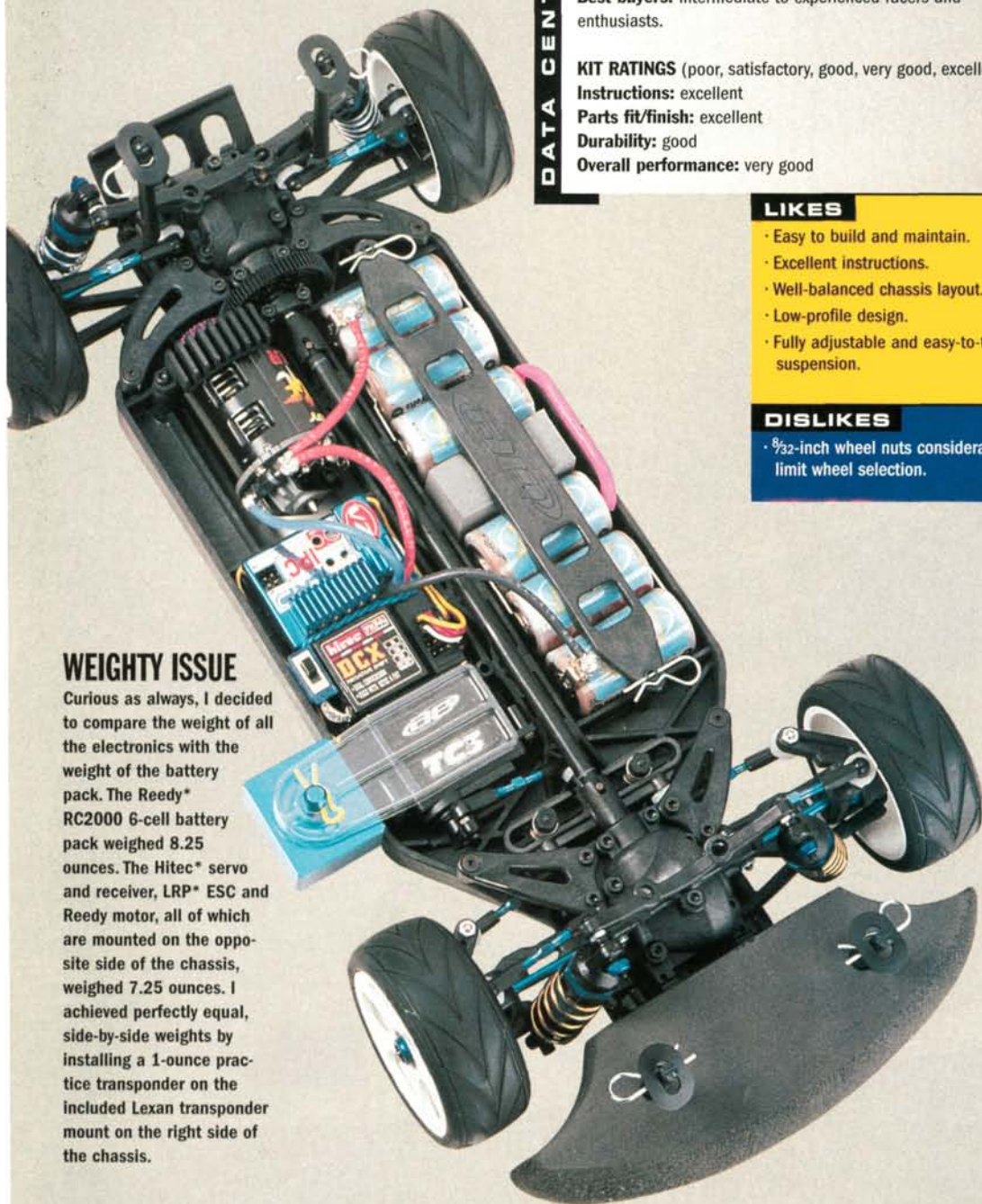
Team Associated TC3

The A-Team goes touring by George M. Gonzalez

No RC vehicle has been as keenly anticipated as the Team Associated TC3 1/10-scale, electric, 4WD touring car. And because of its unconventional shaft-drive design, no other RC vehicle has been scrutinized as much as the TC3 or has caused armchair engineers to argue a design's alleged benefits and pitfalls so vehemently. However, based on Associated's reputation for designing world-championship-caliber RC vehicles and the great success of other Associated products, many loyal Team Associated customers ordered their cars sight unseen. I was eager to test the A-Team's new tourer, and I'm sure you're ready to hear how it handled, so let's get started.

PHOTOS BY WALTER SIDAS





WEIGHTY ISSUE

Curious as always, I decided to compare the weight of all the electronics with the weight of the battery pack. The Reedy® RC2000 6-cell battery pack weighed 8.25 ounces. The Hitec® servo and receiver, LRP® ESC and Reedy motor, all of which are mounted on the opposite side of the chassis, weighed 7.25 ounces. I achieved perfectly equal, side-by-side weights by installing a 1-ounce practice transponder on the included Lexan transponder mount on the right side of the chassis.

DATA CENTER

Vehicle type: 1/10-scale 4WD electric touring car
Best buyers: intermediate to experienced racers and enthusiasts.

KIT RATINGS (poor, satisfactory, good, very good, excellent)
Instructions: excellent
Parts fit/finish: excellent
Durability: good
Overall performance: very good

LIKES

- Easy to build and maintain.
- Excellent instructions.
- Well-balanced chassis layout.
- Low-profile design.
- Fully adjustable and easy-to-tune suspension.

DISLIKES

- 9/32-inch wheel nuts considerably limit wheel selection.

SPECIFICATIONS

SCALE 1/10
LIST PRICE (TEAM/RACER)
 \$369/\$269

DIMENSIONS

Wheelbase 10.18 in. (259mm)
Width (F/R) 7.44 in./7.5 in. (189mm/190mm)

WEIGHT

Gross, RTR 53.75 oz. (1,524g)

CHASSIS

Type Semi-tub
Material Molded-fiber composite

DRIVE TRAIN

Type Shaft-drive 4WD
Primary Pinion/spur
Drive shafts (Team/Racer) MIP CVD; aluminum/molded
Differential(s) Stealth ball diffs
Bearings/bushings (Team/Racer) Sealed ball bearings; Teflon/rubber

SUSPENSION (F/R)

Type Lower suspension/upper adjustable link
Damping (Team/Racer) Team Associated VCS oil-filled shocks; aluminum/plastic

WHEELS

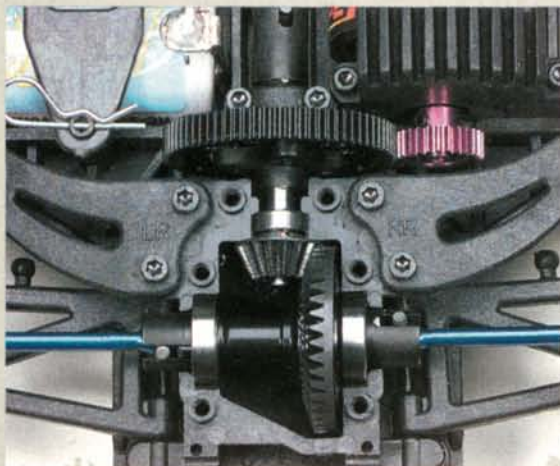
Type Pro-Line one-piece plastic
Dimensions (DxW) 2x1 in.

TIRES

Type Pro-Line V-Rage (S2 compound)

ELECTRICS (NOT INCLUDED)

Motor Reedy TC1 12-turn double
Battery Reedy Zappers RC2000 Sanyo cells
ESC LRP IPC V7.1
Transmitter/receiver Hitec Lynx 3D/Hitec DCX
Steering servo Hitec HS-925MG



Left: the TC3's drive train is incredibly simple and has a very low parts count. As you will notice whenever you squeeze the throttle trigger, it is also extremely light and efficient. The differential's ring gear and the drive shaft's pinion gears are precisely molded for the smoothest possible operation. Right: on the Team kits, blue-anodized aluminum shock bodies and MIP CVD axles are standard, while the Racer kits include plastic shock bodies and composite CVD axles. Check out the variety of available upper shock and inner camber-rod mounting locations.

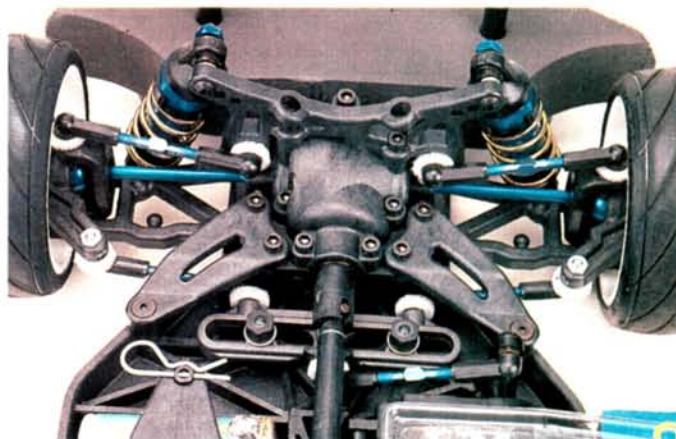


KIT FEATURES

• **CHASSIS.** The TC3's molded semi-tub chassis features truss-shaped reinforcing ribs and separate front and rear chassis braces to increase strength and rigidity. The chassis is designed to accept a variety of battery configurations. Seven battery slots are molded on the left side of the chassis to allow a 6-cell battery pack to be moved forward or rearward to adjust weight distribution. A molded battery strap secures the cells to the chassis, and foam battery spacers are provided to fill the extra battery slot. Both six-cell, stick- and racing-style (side-by-side) battery configurations can be used, but saddle-packs offer the most adjustability; they can be moved forward and backward, and they can also be split down the middle to distribute the weight evenly across the chassis.

To counterbalance the weight of the battery, the servo, receiver, ESC and motor are mounted on the right side of the chassis. Select your electronics carefully to achieve a perfect side-to-side weight ratio, however.

The motor is installed in line on a molded, motor-mount bulkhead, and a separate cast-aluminum upper mount clamps down on an eccentric mounting plate that's secured to the motor. The upper mount features a finned aluminum heat sink to help dissipate



The TC3's unique sliding-rack steering system provides the proper Ackerman angle at all times, and this improves handling and reduces tire wear. The rack system slides on bronze bushings (ensures smooth operation) and features a built-in servo-saver.

heat. After loosening two screws, you can move the motor aside to make quick and easy pinion-gear changes or remove it completely for maintenance.

• **STEERING.** The TC3 features Team Associated's patented ATAC (Associated true Ackerman concept) sliding rack-steering system. This is quite a departure from the more common bellcrank steering

systems found on most RC cars. Basically, the steering system is designed to provide the proper Ackerman angle at all times, and this makes handling more consistent and helps reduce tire wear. The rack slides smoothly on bronze bushings and includes a built-in, adjustable servo-saver to protect the steering servo in the event of a run-in with a board or another solid object.

• **DRIVE TRAIN.** The TC3 breaks the belt tradition by using a shaft-drive system.

The TC3's hollow, woven-graphite drive shaft mates with the front and rear differentials via composite ring and pinion gears that yield a 2.5:1 internal gear ratio. The kit includes a 72-tooth, 48-pitch spur gear that allows a broad range of gearing choices for both stock and modified applications.

Identical front and rear Stealth ball differentials are installed inside front and rear sealed transmission cases that are also identical. The sealed cases prevent debris and road grime from entering the diffs and contaminating them, thereby reducing the need for maintenance. If you plan to race the TC3 primarily for fun on dusty street corners and parking lots, this is a huge benefit. Diff access couldn't be any easier: simply remove the shock tower, one of the camber links and six screws, and the diff will

building & setup tips

Team Associated includes great instruction manuals with all of its kits, and in my opinion, the TC3's is the most concise and straightforward to date. It's filled with three-dimensional illustrations that practically jump off the pages; hardware is shown in its actual size, and necessary tool legends are provided for every step. Several pages of valuable tuning tips help you understand the car's many tuning adjustments, and a blank setup sheet is also provided so you can document your car's setup from track to track. If you follow the instructions to the letter, you'll be rewarded with a car that's dialed in from the start. Even though the instructions do a great job, I think you'll find these tips quite helpful, too.

■ Bag A, step 2. Lightly grease the bronze steering-rack bushings to ensure their smooth performance. A light motor-bushing oil such as Trinity Royal Oil works best. Be careful not to overtighten the 6222 nylon locknuts that secure the steering rack to the aluminum rack posts.

■ Bag C, step 8. Be sure to fully tighten the 6920 cap-head screw that secures the drive cup to the rear input shaft before you install the orange O-ring. The drive shaft must end up with 1 to 2mm of free play within the drive cups, or the drive train will bind. If the drive shaft binds, the drive cup probably is not fastened securely to the input shaft. Recheck the capscrew to make certain it has been tightened all the way and that the drive cup is

fully seated on the input shaft.

■ Bag C, step 9. Install the spur gear on the spur-gear adapter before you assemble the rear input shaft. I couldn't slide the spur gear over the drive cup as outlined in this step.

■ Bag C, step 15. Do not overtighten the 6924 cap-head screws that secure the drive-bearing cap; otherwise, the drive train may bind slightly.

■ Bag E, steps 3 and 6. Do not overtighten the 3962 setscrews that secure the hinge pins to the front steering blocks and rear hub carriers. If you strip the threads in the blocks and carriers, the hinge pins will not stay in place.

■ Bag G, step 3. Proper installation of the O-ring shock seals and volume-compensating (VC) foam and bobbin in the shock bodies didn't proceed as smoothly as the instructions indicated it would. I had to partially install the shock shafts in the shock bodies (with the internal shock assembly in place), and then, working at a table, I had to force the shafts through by pushing down hard on the piston side of the shock shafts. When the threaded portion of the shafts exited the other end of the shocks, I pulled the shafts through with pliers.

■ Bag H, step 2. Thread the receiver antenna wire through the antenna-tube mount before you install the steering servo. Once the servo is in place, the mount is hard to reach.

YOU'LL NEED

- 2-channel radio system with receiver and one servo.
- ESC.
- Motor and pinion gear.
- 6-cell stick, saddle-pack, or side-by-side battery pack.
- Battery charger.
- 190mm body and paint (Team kit).
- CA glue for the tires.

FACTORY OPTIONS

GRAPHITE PARTS

- TC3 chassis—part no. 3849.
- Battery hold-down—3854.
- A-arms (F/R)—3861/3891.
- Steering blocks and rear hub carriers (sold together)—3877.
- Shock towers (F/R)—3882/3896.
- Front block carriers (0/2/4 degrees)—3869/3871/3873.
- Full graphite component set—3961.

FACTORY TEAM BLUE-ANODIZED ALUMINUM ACCESSORIES

- Machined motor adjustment cam/clamp—3932/3933.
- TC3 screw kit—3935.
- TC3 front one-way assembly—3938.
- Threaded shock-body kit (set of four)—3962.
- Counterfeit transponder—3968.

MISCELLANEOUS PARTS

- Anti-roll bar kit (one; for front or rear)—3960.
- Unobtainium shock shafts (pair)—3964.
- Steering-rack bearings—3971.

be in your hand. Incidentally, the carbide diff balls, rings and thrust-bearing assemblies are standard parts on other Associated car kits—good news, if you also race one of the A-Team's off-road vehicles.

Final drive is accomplished by smooth, efficient MIP* CVD axles, and the entire drive train (and wheels) spin on sealed ball bearings. The Racer kit includes molded CVD axles and rubber sealed bearings, while the Team kit comes standard with blue-anodized aluminum CVDs and Teflon sealed bearings.

• **SUSPENSION.** The TC3 features Associated's Quadra-symmetric suspension, in which the car's front and rear suspension arms are the same length, and the inner and outer suspension-arm pivot points are in line, front and rear. Also, all of the hinge pins are held in place with setscrews, eliminating the need for E-clips.

The car comes standard with 2 degrees of front kick-up, 2 degrees of front caster and 2 degrees of rear anti-squat. The rear end has a total of 3 degrees of toe-in, but the optional arm mounts can simultaneously alter rear toe-in and anti-squat. Optional front arm mounts and block carriers (caster blocks) are also available to provide various caster, kick-up and anti-dive options. (Anti-dive is the opposite of anti-squat; it provides very aggressive steering while it enhances front braking traction when entering corners.)

Spacers allow the rear axle carriers to be moved forward or rearward on the hinge pins to adjust the car's overall wheelbase. Factory Team blue-anodized titanium tie rods are included in the Team kit, and steel turnbuckles are standard on the Racer kit; both allow easy camber and toe-in/out adjustments. Associated's volume-compensating system (VCS) shocks feature double O-ring seals and inner volume-compensating foam pads to help prevent air from getting inside the shock bodies. The Team kit includes blue-anodized aluminum shock bodies; the Racer kit includes molded-plastic shock bodies. Both versions provide smooth, consistent damping, but the molded units are actually lighter. Both kits include tuned springs, 40WT silicone shock fluid and a variety of shock pistons and preload spacers to adjust the car's damping, ride height and chassis tweak.

• **WHEELS, TIRES AND MORE.** Both the Team and Racer kits come with Pro-Line one-piece wheels and S2 compound V-Rage tires and inserts. The TC3 uses standard 12mm wheel-hex adapters, and that means that Tamiya* and HPI* wheels (or any other 1/10-scale touring-car wheels that have similar offsets) may be bolted right onto the axles. The TC3's axles are threaded to accept 3/32-inch (American standard) locknuts, and a set of lightweight, blue-anodized aluminum locknuts are provided. Since most TC

wheels are designed for smaller (4mm) locknuts, larger ones considerably limit wheel selection. Basically, wheels with deeply recessed hubs will be very difficult to install on the TC3. I ended up replacing the 3/32 locknuts with 4mm, molded nylon nuts, which are basically self-tapping. Now I can use practically any available wheel and tire combo.

The Racer kit is available with a choice of three Protoform* bodies: Dodge Stratus, Honda Accord, or Alfa Romeo 156. The Team kit doesn't include a body, so I ordered a Protoform Dodge Stratus because it's my shape of choice for TC racing.

PERFORMANCE

I decided to give the TC3 its shakedown run at BW Raceway in Riverside, CA. BW Raceway is the only track in Southern California that has outdoor racing on Wednesday nights—an especially pleasant experience during summer and early fall. After slowly circling the course a couple of times to get a feel for the car and the track, I opened up the throttle to see what the TC3 could do. The car felt a little slippery at first, but once the new Pro-Line/Jaco capped tires started to wear in, I was able to tighten up my lines and circle the course at a decent pace. I had installed the battery pack in the rear, and its weight resulted in a slight push. When you run the car the first time, I highly recommend that you install the battery pack in this position so you'll be able to get a feel for the car and the track.

On the very next run, I installed the battery pack in the forward position to see if I'd notice any difference in the car's handling. I was amazed; it had considerably more steering. It almost felt loose! I was able to negotiate the technical sections with greater speed, but my overzealous throttle finger nearly caused the car to swap ends every time I exited a tight corner. I decided to install a saddle pack on the chassis with the foam spacers in the middle so the battery pack's weight would be evenly distributed across the chassis. Bingo! The car was dialed! I couldn't believe how easy it was to tune the TC3 to the track, and that proves that the stock factory setup really works.

Once I had settled on the battery placement, I started to tweak the chassis to see whether I'd be able to improve my lap times. After a short trial-and-error session, I arrived at a setup that indeed shaved valuable seconds off every lap. I moved the upper shock mounts from the top holes on the front shock tower to the middle holes; this caused the front shocks to lean in toward the chassis centerline and provided more progressive damping. This slightly raised the front end, but after I installed one additional no. 4187 shock limiter inside each front shock body, the front ride height returned to the stock position. I filled up the front shocks with

Continued on page 213

test gear

Note: the car pictured on these pages is assistant editor Greg Vogel's test car. The following equipment is what I used on my TC3.

• **Hitec Lynx 3D transmitter.** My Hitec Lynx 3D radio system and DCX dual-conversion receiver

have yet to glitch since I started using them nearly a year ago. The unit's auto dual rate (ADR) feature has also proven to be invaluable and has helped me become a smoother driver. As expected, it performed flawlessly and kept me in control of the TC3 at all times.

• **Hitec HS-925MG servo.** With

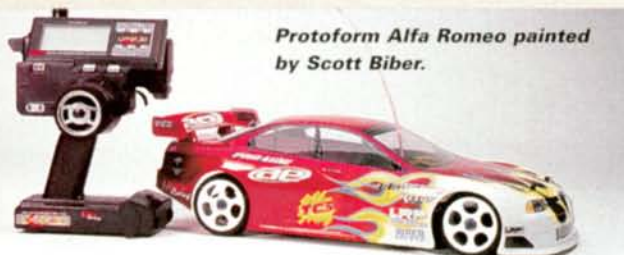
a transit time of 0.08 second and 103 oz.-in. of torque (at 6 volts), I had no doubt that this high-quality, coreless motor servo would whip the TC3 around with authority. The 925 performed well above my expectations, and I was impressed by its speed and centering capabilities.

• **LRP IPC V7.1 ESC.** In the photo, an LRP V6 ESC is shown installed in the chassis, but I actually used the newer IPC V7.1 in my tests. The V7.1 ESC has updated software and new, more powerful and efficient FETs. It provided super-smooth power transfer, and I had plenty of battery power left over after every race.

• **Reedy TC1 motor and Zappers RC2000 cells.** I

decked out our TC3 test sample with a Reedy TC1 12-turn motor and a fresh set of Reedy Zappers RC2000 matched cells. I wanted to see whether the TC3 would be able to handle some serious horsepower and finish the race with time to spare. The car was ballistic, as expected; not once did I DNF.

• **Pro-Line/Jaco cap tires.** The stock Pro-Line V-Rage tires are long-wearing and provide adequate grip, but stickier tires were necessary to control the car with precision. I used Pro-Line/Jaco cap tires during the race testing; they had my TC3 glued to the track and lasted through a few weekends of racing.



Protoform Alfa Romeo painted by Scott Biber.



ProTrax Rustler RTR

A no-tool Traxxas by Peter Vieira

DO YOU WANT to get started in RC *right now*, as in this second—no building, no painting? Horizon Hobbies*, with the help of Traxxas, has put together a line of vehicles just for you. Here's the concept: the

ProTrax Rustler and Stampede take the very popular Traxxas stadium- and monster-truck designs and package them with finished, trimmed and decaled bodies and installed Traxxas radio systems complete with electronic speed controls. Only the

PHOTOS BY WALTER SIDAS



simplest, no-tool “assembly” is required (does putting batteries in the radio and plugging in the antenna count as assembly?), and since the ProTrax machines are electric, they’re up and running with just a flick of a switch. I tested the

ProTrax Rustler version to see if it really is that simple to get started, and I was surprised by how well the truck performed—and not just as an RTR. Keep reading for the details.

READY-TO-RUN REPORT

Pro Trax Rustler RTR



The Rustler includes an adjustable slipper clutch to protect the transmission and help put the power down smoothly on slippery surfaces.

DATA CENTER

Vehicle type: 1/10-scale, 2WD electric ready-to-run stadium truck.

Best buyer: first-time RC hobbyist looking to hit the backyard as soon as possible with a reliable, durable, affordable stadium-style truck.

KIT RATINGS (poor, satisfactory, good, very good, excellent)

Instructions: very good

Parts fit/finish: very good

Durability: very good

Overall performance: very good

The monster-style Stampede is also available with the ProTrax treatment. It's equipped just like the Rustler.

LIKES

- Great-looking "paint" job.
- Nearly indestructible.
- Lots of features, including 20-turn motor, slipper clutch and universals.

DISLIKES

- Transmission is a bit noisy.
- Charger and battery not included.



SPECIFICATIONS

SCALE 1/10

LIST PRICE \$339.95

AVAILABLE AT \$219.95

DIMENSIONS

Wheelbase 11.3 in.

(286mm)

Width (F/R) 12.4 in.

(315mm)

WEIGHT

RTR, as tested

55 oz. (1,559g)

CHASSIS

Type Molded semi-tub

Material Fiber-reinforced plastic

DRIVE TRAIN

Type Gearbox

Primary Pinion/spur gear

Drive shafts Telescoping plastic universals

Differential(s) Planetary gear

Slipper clutch Traxxas adjustable

Bearings/bushings

Bearings in tranny only

SUSPENSION (F/R)

Type Lower A-arm with fixed camber link

Damping Plastic oil-filled coil-over shocks

WHEELS

Type Chrome finish, one-piece plastic

TIRES (F/R)

Type Traxxas Pro-Trax 4780 ribbed/4790 pin-spice

ELECTRONICS

Transmitter Traxxas Top Qualifier

Steering servo Traxxas 2018

ESC Traxxas XL-1

Motor Traxxas Stinger

Battery Trinity Heavy Metal NiMH (not included)

You'll need

- Stick-type, 6-cell battery pack with Tamiya-type connector.
- Charger for battery.
- 8 AA alkaline batteries to power transmitter.

VEHICLE FEATURES

1. Telescoping, universal-joint drive shafts. No dog-bones to pop out or lose. Good feature.

2. Molded plastic chassis. Flexible enough to withstand huge hits, but stiff enough for solid performance.

3. Oil-filled Big-Bore shocks. The Rustler's plastic dampers are genuinely plush, but they could have been built a little better: I could hear air bubbles swish through the pistons. That's a minor gripe, though; I'm glad they're built and filled with oil at all!

4. Fixed camber links. The plastic camber links won't bend in a crash, and there are no adjustments for beginners to goof up.

5. Stinger 20-turn motor. Too many entry-level kits include wimpy motors that have drivers looking for more power before the first pack is dumped. The Stinger delivers decent top speed and torque.

6. Ball-bearing, slipper-clutch-equipped transmission. The Magnum 272 tranny has some excellent features. The planetary gear differential is super tough, and a complete set of ball bearings helps the truck run its fastest. An adjustable slipper clutch protects

the transmission gears from damage on power-on landings or overaggressive forward/reverse abuse.

7. Chrome wheels. These are a ProTrax exclusive; the kit Rustler includes white wheels. The chrome jobs won't make the Rustler go any faster, but they do look faster.

8. Turnbuckle tie rods. Unlike fixed tie rods (which aren't adjustable) or threaded tie rods (which must be removed to be adjusted), the Rustler's steel turnbuckles make it easy to adjust toe-in with just a spin of the included wrench.



IN THE BOX

■ **Traxxas XL-1 electronic speed control (installed).** This ESC design has been around forever, as evidenced by its chunky case and big heat sinks. It's a low-frequency, reversing ESC, which means it can get rather hot in use, but I found it totally reliable; no throttle problems.

■ **Traxxas Top Qualifier 27MHz transmitter and 2019 receiver (installed).** The "TQ" radio set is a Traxxas staple, and its trademark funky shape is easy to spot. The radio features easy-access servo-reversing switches and trim knobs, adjustable trigger throw and a "radio on" LED—basic stuff, but the setup is more than capable of controlling the Rustler. My only gripe is with the length of the receiver's antenna wire: it overshoots the end of the supplied antenna tube by 9 inches, so it could be damaged in rollovers and crashes.

■ **Factory-finished and trimmed body.** I say "finished" instead of "painted" because Traxxas somehow managed to print the graphics on the shell; I don't know how it was done, but they look great and don't chip. The body arrives colored and decaled as seen in the photos, and additional decals are included for a custom look. Other color schemes are offered with the Rustler (and the ProTrax Stampede, too); the color is keyed to the frequency of the included radio. This is a cool idea; when your buddy buys a ProTrax, all he has to do is get the other color scheme to avoid a frequency conflict when you race.

■ **Traxxas Stinger 20-turn motor (installed).** The included, closed-endbell motor doesn't look any faster than the usual 540 mill, but there's a 20-turn armature in there. That's RC lingo for "faster," and the Stinger powerplant does have more scoot than the typical Mabuchi or Johnson "silver can" 540 motor.

■ **Instructions, spares and tools.** A complete assembly manual is included with the ProTrax Rustler, so you won't be left in the dark when it's time to disassemble the truck for maintenance or repair. There's also a "Quick Start" guide that explains how to get the truck from the box to the track. It covers transmitter battery installation, trim adjustment, antenna installation and body mounting. As a reader of *Radio Control Car Action*, you probably won't even need to look at the Quick Start guide, but for total beginners, it will be a great help.

To help tune the truck to the track, a complete set of shock-

preload spacers is included, along with additional shock pistons for "advanced" tuning. There's even a smaller, 78-tooth spur gear included to replace the installed 84-tooth gear; the optional gear will give you more top speed. You'll also find a few tools in the box: a pair of stamped wrenches to fit the truck's nuts and steering links, a universal-joint assembly tool, a pair of hex wrenches and a four-way socket wrench. Add a pair of pliers and a good screwdriver, and you'll have all you really need to work on the Rustler.

PERFORMANCE

The ProTrax was first tested in the halls of *Radio Control Car Action's* offices, where the combination of pin-spoke tires, carpeting and a tight slipper-clutch setting made it easy to pull wheelies by getting up a little speed in reverse and then blasting the forward throttle. The wheelie commotion quickly tripped the goof-

off signal, and my editorial partners in crime—Steve, Greg and "4x4" columnist Kevin Hetmanski—joined me for some potentially tranny-busting mayhem. We took turns in an impromptu contest to see who could carry the front wheels the farthest, and we dumped an entire 3000mAh pack just on wheelies. The tranny didn't complain, but the ESC didn't like that back-and-forth action; its heat sinks were way hot.

I next took the Rustler over to the local schoolyard for some street- and backyard-style abuse. The soft, long-travel suspension (and a little speed) allowed the truck to easily hop up curbs by approaching them at an angle (head-on works, too, but it's an ugly way to get over a curb), and speed bumps were easily absorbed by the suspension. Less easily absorbed were the hard landings the Rustler took when I sent it down a set of concrete steps. The chassis slapped hard and was heavily scuffed after a few passes, but nothing broke. Street use will quickly wear out the tires (the rears will be the first to go), but if you want to go as fast as possible, the street is where it's at.

A baseball diamond provided the dirt for an off-road excursion, during which I found the Rustler more than willing to slide through turns sideways; I did this by touching the brake when entering a turn and countersteering with the power on to pull through. The pitcher's mound was an effective jump, and the Rustler was an equally effective jumper: just point it at the jump, gas it, and let it do the rest. I finished off my last pack taking runs at the pitcher's mound, then I packed it in; the sun was going down, and I was hungry!

THE VERDICT

I thought about the ProTrax Rustler as I put away my number-two Extra Value Meal, and it occurred to me that I never gave a thought to the assembly of the kit; some RTRs are more "ready to rebuild" than they are "ready to run," but the ProTrax was perfect. The pinion stayed put, nothing fell off, and the radio was dialed in right from the box; I can't imagine an easier way to get started in RC (actually, I can: how about a ProTrax combo that includes a stick pack, charger and transmitter batteries?). Although nitro-powered RTRs have been getting a lot of attention, you can't beat an electric for total ease of operation, and that's what the ProTrax Rustler (and Stampede) is all about: easy RC fun.

*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■



Turnbuckle tie rods make toe-in adjustments easy, while fixed camber links increase durability.



Telescoping universals are a welcome feature. There are no dogbones to lose!



Tamiya M-04L BMW Z3

Tamiya's latest mini goes ragtop by Louie Patterelli

When it comes to quality, detail and innovation, Tamiya's* reputation is well-known. With the recent release of the second-generation M-chassis—the M-04L BMW the company adds another dimension to the run-for-fun RC car segment. The original “M” was very versatile. Its wheelbase length

could be adjusted to accommodate a variety of body shells, and it could be front-wheel or rear-wheel drive. All this made it possible to have a Mini Cooper or a Porsche 911 on the same chassis.

The new “M” takes the original's versatility to a new level: many parts are interchangeable with those on the

PHOTOS BY WALTER SIDAS



TL01 chassis (Tamiya's excellent, beginner-level sedan). This gives the M-04L a performance potential that users of the first "M" could only have dreamed of.

It's a pleasure to own this BMW roadster; let's see what it's like to build and drive this diminutive dream machine.

Vehicle type: 2WD electric mini
Best buyer: any fan of the mini-class; modelers who are looking for an authentic RC BMW Z3.

KIT RATINGS (poor, satisfactory, good, very good, excellent)
Instructions: excellent
Parts fit/finish: very good
Durability: very good
Overall performance: good

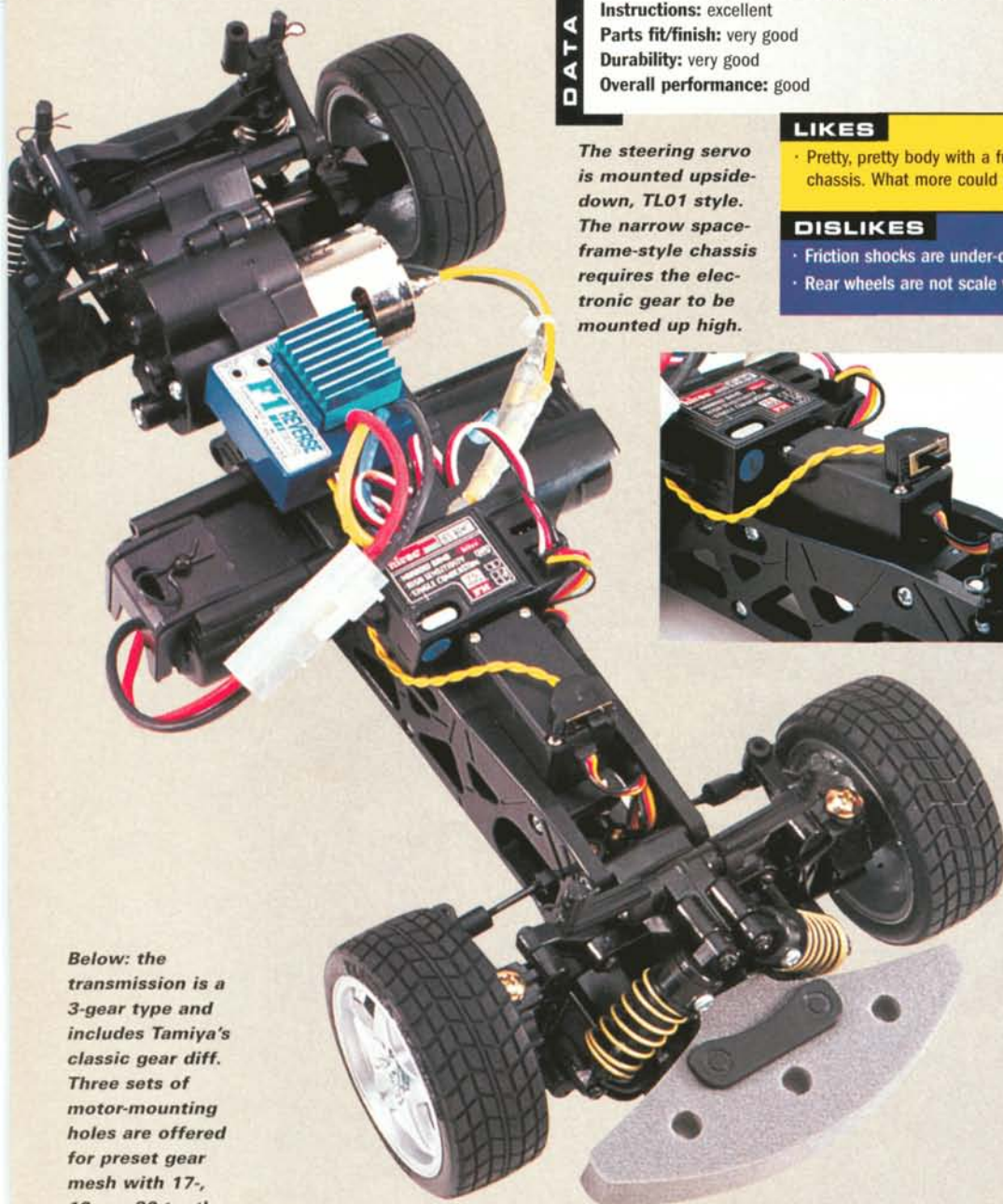
LIKES

• Pretty, pretty body with a fun-to-drive chassis. What more could you want?

DISLIKES

• Friction shocks are under-damped.
 • Rear wheels are not scale width.

The steering servo is mounted upside-down, TL01 style. The narrow space-frame-style chassis requires the electronic gear to be mounted up high.



Below: the transmission is a 3-gear type and includes Tamiya's classic gear diff. Three sets of motor-mounting holes are offered for preset gear mesh with 17-, 19-, or 20-tooth pinions.



Right: this nicely shaped foam bumper is included with the kit. The friction shocks don't offer much damping, but the supplied soft springs improve handling.



SPECIFICATIONS

SCALE 1/10
LIST PRICE \$154
AVAILABLE AT \$69.99

DIMENSIONS

Wheelbase 9.37 in. 1/10 (238mm)
Width (F/R) 6.46/6.85 in. (164/174mm)

WEIGHT

Gross, as tested 41.76 oz. (1,184g)

CHASSIS

Type Molded space frame
Material Plastic

DRIVE TRAIN

Type (F/R) Gear
Primary Pinion/spur
Drive shafts Dogbone
Differential(s) Gear
Slipper clutch No
Bearings/bushings Bushings

SUSPENSION (F/R)

Type Lower A-arm w/fixed upper link
Damping Coil-over shocks

WHEELS

Type One-piece molded plastic
Dimensions (DxW) 2x1 in. (51x25mm)

TIRES

Type (F/R) Tamiya firm treaded radial/Tamiya Super Grip treaded radial

ELECTRICS

Motor 540 stock
Battery Trinity Zip Pack (not included)
Speed control 3-step mechanical

KIT FEATURES

CHASSIS. The new M-04L was designed to be rear-wheel-drive only. The wheelbase may be adjusted, thanks to the bulkhead extension that gives this particular chassis its "L" (for long) designation. Without the bulkhead, the chassis would be the appropriate length (225mm) for a Tamiya Miata or Alfa Romeo Giulia body. The chassis consists of two main halves that connect the front-suspension bulkhead and the rear gear case. A platform holds a small electronic speed control and an equally small receiver. If you choose to use the included wiper-style speed control, you'll mount it on an outrigger that has a cage to protect it from any side impacts. A front foam bumper promises damage control.

DRIVE TRAIN. The 3-gear diff has been with the M-chassis since the beginning, and if it ain't broke, don't fix it. It offers low maintenance and dependable performance.

A bevel-gear diff distributes power to the rear wheels by the way of steel dogbones and drive cups. There *has* been some evolution in the pinion-gear-selection department: you can now choose a 17-, 19-, or 21-tooth pinion gear instead of the previous version's 16-, 18- and 20-tooth options. Tall sedan tires driven by a higher final gear ratio ... hmm ... Tamiya had some speed in mind.

SUSPENSION AND STEERING. What's the use of being able to go faster if all hell breaks loose when you get to a corner? With this suspension—independent A-arms all around—cornering isn't a problem. Keeping those suspension arms in line are four friction shocks; up front, a softer pair of springs do their best to help the

front wheels carve sharp corners; fixed upper links round out what is essentially a narrowed TL01 suspension.

The direct-link servo-saver is from the TL01. Compared with the drag-link bellcrank systems found on other Tamiya vehicles, the system is virtually slop-free and provides precise steering control. Hallelujah!

BODY, WHEELS AND TIRES. The BMW Z3 body has to be Tamiya's best effort to date. If it had an interior, it would be impossible to tell it from a real M roadster in photos.

My only gripe is that Tamiya didn't do wide, deep-dish, wheels for the rear. The front wheels are beautiful renditions of the real car's fronts, though. As for tires, you'll find standard radials in the front and Super Grip radials in the rear (for a more neutral cornering attitude).

PERFORMANCE

From the first pull of the throttle to the last turn of its wheels, this car will keep a smile on your face. The included 540 motor makes for spirited acceleration without overtaxing the supple suspension. Throw the car hard into a corner with reckless abandon, and the result is mild understeer. Of course, you can nail the gas mid-corner and get a nice antisocial power slide for your efforts.

The rough pavement in front of my house has adversely affected the performance (not to mention the undersides) of just about every car I've played with—uh, tested—over the years. To my surprise, the M-04L chassis' ample ground clearance and soft springs just soaked up every imperfection.

FINAL THOUGHTS

The suspension is far from race worthy, and the tires are designed to limit grip more than provide it, but let's keep Tamiya's purpose in mind: fun is the operative word, and that is what Tamiya has delivered in a very small package—by the truckload.

As always, there are no disappointments with Tamiya's quality, and the chassis comes wrapped in an equally impressive, beautiful, sports-car package

that adds to the "gotta have it" factor.

*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■

building & setup tips

Building a Tamiya car is like ... well ... building a Tamiya car. In the RC industry, Tamiya sets the standard for easy-to-follow instructions. Even if the instruction manuals were available only in Japanese, they would still be easy to follow. Here are a few tips to make the job even easier.

■ Assembling the suspension arms gets me every time. A nub on each half indicates in which direction the arms should be assembled. Pay close attention to the illustrations.

■ Install the front shock support before you screw the front bulkhead halves together.

■ When assembling the bevel-gear diff, go easy on the grease to keep it loose. The car will be easier to drive. You'll have to live with spinning the inside wheels, but that's better than looping the car (which will happen in almost every corner if you overdo the grease).

YOU'LL NEED

- RS-540 Sport tuned motor—part no. 53068.
- M03 ball-bearing set—53348.
- On-road tuned-spring set—53163.
- TA03 ball diff—53267.
- TA03 low-friction damper set—53280.
- TL01 stainless-steel suspension shafts—53301.

FACTORY OPTIONS

- 2-channel radio system with receiver and two servos (or servo and ESC).
- 6-cell battery pack.
- Battery charger.
- Paint for the Lexan body.
- CA glue for the tires.

test gear

• **Hitec Lynx 3D transmitter**
Hitec's FM radio is as well featured as other "pro" systems, but its

lower cost made it particularly attractive to me. The 3D is a lot more radio than the Z3 really needs, but a good radio improves any RC experience.

• **Tekin* TMF27 receiver**

Swapping a receiver from car to car gets old fast, so I picked up this Tekin unit to simplify things. Now I can really exploit my radio's model memory, and I don't have to peel off servo tape to do it!

• **Futaba S3003 servo**

The lightweight mini chassis needs nothing more than a standard

servo to steer it, and the S3003 was handy.

• **LRP* Indy 600 ESC**

Tamiya includes a mechanical speed control with the kit, but I opted for an ESC. The Indy 600 is LRP's best forward-only ESC below the IPC series, and it only gives up a little on resistance and maximum amp load. The Indy line has since given way to the new IPC lineup; the Indy 200, 400 and 600 have been replaced by the IPC Sport, Super Sport, and Pro. LRP's top-of-the-line ESCs are the IPC V6, V7.1 and "SR" stock racing model.



OFNA Z-10 Mark II

Familiar features highlight the
newest Z-car

by Doug Mertes



PHOTOS BY WALTER SODAS



With the release of OFNA Racing's* OB-4 mid-motor touring chassis, you might think the OFNA gang had abandoned any further development of the more traditional Z-10 platform. Not so; in fact, OFNA has injected new life into the line with a "Mark II" version of the Z-10 that combines some interesting features of its own with concepts proven on other makers' designs. The overall package looks like a competent, well-equipped racer, but the track, as always, is the real test of a car's effectiveness. We'll see if this "Z" really is a 10.

TRACKTEST OFNA Z10 Mark II



DATA CENTER

Vehicle type: 1/10-scale, electric, 4WD competition touring car
Best buyer: racers or performance-minded enthusiasts in need of a competition-worthy kit that does not overwhelm with tuning options

KIT RATINGS (poor, satisfactory, good, very good, excellent)

Instructions: not supplied with test kit

Parts fit/finish: very good

Durability: very good

Overall performance: very good

LIKES

- Adjustable deck tension.
- Efficient drive train.
- Supersmooth Delrin differentials.

DISLIKES

- Shocks are too long.
- Battery holder design needs to be improved.
- Included tires are not as race-worthy as the chassis

SPECIFICATIONS

SCALE 1/10

LIST PRICE \$259.99

DIMENSIONS

Wheelbase 10 in. (254mm)

Width 7.6 in. (193mm)

WEIGHT

Gross (as tested) 45 oz. (1.276g)

CHASSIS

Type Double-deck plate; two-piece upper deck

Material Graphite

DRIVE TRAIN

Type Dual belt

Primary Pinion/spur

Drive shafts (F/R)

Universal CVAs, dogbones

Bearings/bushings Sealed bearings throughout

SUSPENSION (F/R)

Type Lower A-arm w/turn-buckle upper link

Damping Oil-filled shocks

WHEELS

Type One-piece plastic

Dimensions (DxW) 2x1 in.

TIRES

Type (F/R) Treaded rubber w/foam inserts

ELECTRONICS

(not included)

Transmitter/receiver

Futaba 3PDF

Steering servo Futaba

S132H

Speed control Tekin

411-G2

Motor Trinity Midnight 2/

Reedy 12x2

Battery

Trinity RC1700 matched



Molded straps hold the cells in place firmly, but they're difficult to cinch down. A couple of washers placed under the "hook" side make it easier to open and close the setup.



Above: the Yoko-style "shock" is mounted on a rigid aluminum standoff to subtly adjust chassis flex.



Left: you can just see the Delrin diff in this shot. Check out the graphite shock tower, turnbuckles and swaybar; this is meat-and-potatoes racing stuff.

KIT FEATURES

• **Chassis.** The Z10 uses a conventional long-'n'-short twin-belt layout. The motor is in the back, ahead of the rear differential but closer to the chassis centerline than in many other sedans. That means you don't need to worry about offsetting the batteries or electronics to balance the car's weight from side to side.

The saddle-pack cells are almost precisely in the middle of the chassis, and slightly closer to the front than they are in some designs. Although this means there isn't much room for the ESC and servo between the batteries and the steering linkage, everything fits as long as you don't use huge components. Slots and cutouts in the graphite chassis plate (there's no fiberglass on this car!) allow critters, small stones and debris to pass through the drive system and right out through the bottom. The rubberized-plastic battery holders are difficult to use. They caused me to bust

up my knuckles every time I changed the batteries. Pro owners should replace them with a set of OFNA's Velcro®-brand fastener straps.

The MkII uses a Yokomo-style two-piece upper deck. The front portion is solidly connected to the front gear case, the steering linkage and a pair of stout aluminum uprights, while the rear half is screwed to the motor plate, layshaft mount and rear gearbox. A short spring-loaded device connects the two—kind of like a shock absorber but without any damping. Adjusting the tension on the spring not only tightens up the long belt, but it also alters the relationship between the top deck and the lower plate. A looser setting will result in more rear traction and less steering because the suspension won't have to work as hard. Higher preload settings increase steering, reduce rear traction and cause the car to tighten up and slide in the turns. This is a great idea that really works when the basic platform is designed properly.

building & setup tips

My Pro MkII was so new that it did not yet have an assembly manual; I still managed to put everything together.

■ Use a Dremel* tool to grind down and smooth the sharp edges on the battery slots to prevent them from cutting through the cells' insulation. A little CA on the exposed edges prevents the chassis layers from separating in an accident.

■ The diff screws are too short. Dump the split-washer springs and tighten down the screws until the diff pulley won't turn when the out-drives are held in place. You should still have great diff action but no slipping.

■ The front-belt tensioner runs on a nylon bushing that may be replaced with a bearing for best possible performance.

■ The steering linkage has some slop, but it isn't bad. OFNA includes a Z-bend wire to join the left and right steering bellcranks, but there's room for a short turnbuckle if you'd like to tighten the steering response.

■ The electronics went in very easily. My Futaba S132H could have been replaced with a larger 9101 or 3003 without much difficulty. Even the relatively large (by today's standards) Tekin speed control had plenty of breathing room. The receiver went onto the upper deck, however; there just wasn't space for even the teeniest receiver on top of the servo when the plugs had been inserted.

YOU'LL NEED

- 2-channel radio.
- Steering servo.
- 6-cell saddle-pack battery.
- CA glue.
- 190mm body and decals.
- Electronic speed control.
- Polycarbonate-compatible paint.
- Motor.

FACTORY OPTIONS

Not much has been developed specifically for this new model yet, but some of the Z10 Nitro aluminum parts will fit:

- Front lower arms—part no. 37925.
- Rear lower arms—37926.
- Front steering knuckles—37922.
- Coated steel differentials—37141.
- Aluminum steering linkage—37947.
- "C" carrier for front spindle—37923.
- Rear hub carrier—37924.
- Front hinge-pin mount—37940.
- Rear hinge-pin mount—37941.

• **Drive train.** This two-belt setup runs off a bearing-supported layshaft that's directly driven by the spur gear. A long belt runs to the front differential and is prevented from dragging on the battery pack and steering linkage by a simple belt tensioner. The rear belt runs from the back of the spur-gear mount to the rear ball diff, and the ingenious blue-anodized-aluminum motor mount positions the pinion gear between the upper and lower runs. By balancing spur- and pinion-gear sizes, you can make the motor sit pretty low in the chassis for optimum cornering speeds.

The Z-10's Delrin diffs are super-smooth and don't acquire the gritty feel that usually accompanies a day on the parking lot. Although I found that the included through-screws were too short for the split washer springs, doing without them didn't seem to make any difference to the

test gear

• Futaba 3PJ transmitter

Visit any racetrack, and you're bound to see racers with this popular radio. It has 10-model memory, adjustable throttle and steering expo and other must-have racing features in a comfortable case. There are countless other features for those of you who live to tweak your radio.

• Novak NER-3FM receiver

In my experience, this old standby operates just as well as the factory Futaba receiver included with the 3PDF (which I installed in another vehicle). I plan to upgrade to Novak's new XXL, but the NER-3 is still going strong.

• Futaba S132H servo

If there's ever an RC electronics hall of fame, this servo should be in it.

Fast, torquey, and inexpensive, the S132H has served me well in many vehicles.

• Trinity RC1700 pack

"Real" racers swear that only 2000mAh cells will do, but for stock racing, these high-voltage cells give up nothing to the higher-capacity units. It doesn't hurt that they're also less expensive.

• Tekin 411-G2 ESC

Another old standby that I just can't kill. This oldest doesn't even have push-button setup, but it still works great. Maybe I'd have more new stuff if I didn't buy such reliable equipment!

• Trinity Midnight 2 Pro and Reedy 12-turn modified motors

It's always interesting to see how a chassis reacts to stock power versus

modified, and my motor choices represent both ends of the horsepower spectrum well. Although not rebuildable, the Midnight 2 is still a competitive motor that will last a long time if well cared for. As for the Reedy 12-turn ... well, would you expect it to be anything less than fast?

• Protoform* Dodge Stratus body

Stratus shells continue to dominate the race scene, and Protoform's is one of the sleekest. The wing is included and is mounted on molded-in standoffs with included aluminum screws, and the detail decals shown in the photos are part of the package. Scott Blich handled the paint for my test car.



TRACKTEST OFNA Z10 Mark II

springs' feel or action. I just cranked those puppies down until the diffs were locked (no slippage at all), and the action was smooth, smooth, smooth. Even under the onslaught of 12x2 Reedy horsepower, the Delrin outdrives remained as straight and unmarred as the day they came out of the bag.

• **Suspension.** Very conventional stuff here. No adjustments can be made to the front suspension except to camber angle and shock location. Unlike the older Z10 and OB4, the new Z10 has no upper arms with caster-angle alternatives—just plain old turnbuckle links (although you do have a choice of inner mounting holes). The arms are molded of reinforced nylon, as are the offset spindles and hub carriers. Universal drive shafts add to drive-train efficiency, while the hinge pins are captured with setscrews—no more losing E-clips! The suspension is solid and easy to understand, and the geometry really works.

In the rear, a graphite shock tower is linked to the hub carriers by a pair of turnbuckle upper links with various mounting options at each end. The included swaybar can't be adjusted for firmness or position on the arm, but if it does its job well, who cares? Like the front arms, the rear arms are linked to the chassis with polished-steel hinge pins; long setscrews adjust the arm's drop angle and eliminate any chassis tweak.

The shock action is excellent and should do a great job of damping, even on the roughest of parking-lot surfaces. Unfortunately, the shock bodies are about 5 millimeters too long for my taste. I really like to slam a sedan because it increases cornering speed, but the lengths of these shocks make it difficult. Put a few spacers inside under the piston, and you won't be able to screw the lower mount onto the shaft. I managed to figure out a way to get everything to work (note the upper shock-mount placement in the pictures), but I would have preferred a more vertical shock.

• **Tires and wheels.** The kit's included tires work fine when running around an empty parking lot; however, I didn't find they worked well in racing conditions. Instead of using the kit tires, try installing Pit*, Ride*, Yokomo*, Cross*, or Pro-Line* skins onto the kit's 12-spoke rims for better handling.

PERFORMANCE

I set up the Pro MkII for the Stock Open sedan class that's run in my local parking lot. The rules are simple: any brand, any hop-up,

stock motors and 6 cells. Cool! In went a Trinity* Midnight 2 Pro motor, a matched set of Trinity's 1700 World cells (you should see the voltage these babies put out—yeow!), a Futaba* S132H high-speed steering servo, one of Tekin's* older 411G2 speed controls and a Novak* NER-3FM receiver. This may not be new stuff right off the shelf, but it just goes to show that well-cared-for equipment from two or three years ago can still be competitive!

Shod with a set of Pro-Line V-Rage low-profile tires, the kit's black springs and 80WT shock fluid all around, the Pro MkII qualified fourth in a field of more than 30 cars that included Street Weapons, Yokomo MR4TCs, Express Pros, TA03s and a Kawada. Not only that, but I didn't have to touch anything on the car all day except to change the batteries and blow off the dust.

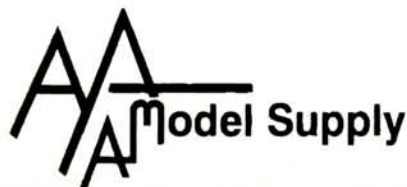
OK, you say; any car handles OK with some puny stock motor installed. Does this thing wilt when you strap in some man-size horsepower? I've never been able to resist a low-turn motor, so out came the Pro and in went a Reedy* 12 double. I dropped the viscosity in the rear shocks to 50WT, moved the rear upper link to the lowest position on both ends, put another slim preload spacer on the rear shocks, and the car handled well, even without slicks. Even down the 100-foot straight section, it did not wiggle or misbehave. Running a modified car is always a challenge because you're on the ragged edge of control so much of the time, but I found the MkII a solid and willing companion when dealing with upscale speeds.

Is it durable? When I snagged a corner dot and took a flier, the car held together well. The front arms have a flat metal hinge-pin brace that's connected to the forward end of the hinge pins with E-clips. I'm convinced that the brace prevented the front arms from parting company with their mounts. Even after a day of hard running, I did not find any loose screws, bent plastic, or misaligned drive-train parts.

THE VERDICT

OFNA's Z10 Pro MkII isn't as adjustable as some of the other cars on the market today, including the company's own OB4 Pro, but when the basic package is as right as this one is, you'll find that all the adjustments in the world won't get you any closer to fast lap times. If you're looking for a car to drive—rather than tune—you should take a close look at this new offering from OFNA.

*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■



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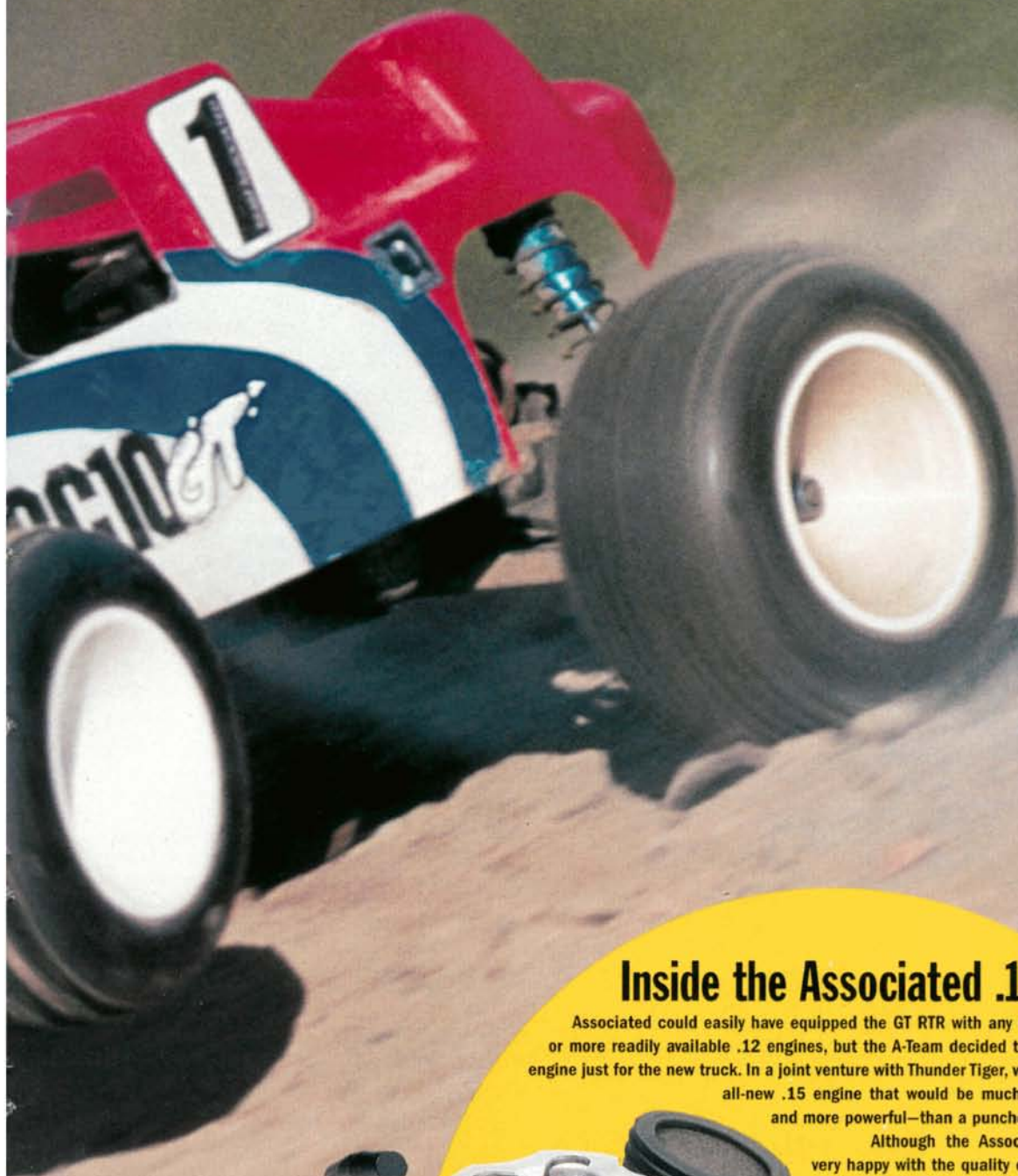
1st LOOK

The ready-to-run concept has been a fixture of the RC car hobby since the beginning, but the last few years have seen a particularly strong move toward factory-assembled kits and true ready-to-runs. The high-performance, racer-oriented manufacturers have, however, shied away from this segment of the market and stuck exclusively with you-build-it-all kits—until now. With a new, factory-built, factory-finished RC10GT, Team Associated* redefines “RTR” as ready-to-race. As RC’s most popular nitro-racing truck, the RTR GT is bound to be a hit, but this machine is more than just a built-for-you GT: the RTR truck incorporates an all-new Associated pull-start engine and new features that will also appear on kit GTs. Here’s the whole story

***You do the racing,
Associated does
the building***

ASSOCIATED by Peter Vieira

RC10GT **Ready-to-Run**



Inside the Associated .15

Associated could easily have equipped the GT RTR with any of a dozen or more readily available .12 engines, but the A-Team decided to build a new engine just for the new truck. In a joint venture with Thunder Tiger, work began on an all-new .15 engine that would be much more innovative—and more powerful—than a punched-out 12.

Although the Associated engineers were very happy with the quality of existing Thunder Tiger engines, their exhaust porting was optimized for ease of production, not maximum performance. The engines used 30-degree port timing instead of 90 degrees (Associated's preferred design).

The 30-degree timing offers a production advantage in that it allows the piston to cycle through a complete revolution of the crank without the wristpin's crossing any ports; this allows the cylinder walls to capture the wristpin, and eliminates the need for any mechanical wristpin retainer. But with this configuration, the exhaust port cannot be as large, and the flow of air and fuel through the engine is less efficient. This was changed with input from Associated.

The result? According to Thunder Tiger, the new 90-degree engine makes 15 percent more horsepower than a comparable .15 with 30-degree port timing. For ready-to-run fans, it's all about power. If this new mill cranks out the ponies as Thunder Tiger and Associated claim, the RC10GT RTR might be the most potent performer in the category.



1st LOOK

The RC10GT RTR's plate chassis looks extra spacious, and it's easier to clean and wrench on—not that you'll need to wrench, since the truck pops out of the box ready to roll.



SCALE $\frac{1}{10}$
ESTIMATED PRICE \$269

DIMENSIONS

Wheelbase 10.5 in. (267mm)
Width 12.37 in. (314mm)

WEIGHT

Gross, RTR 67.2 oz. (1,905g)

CHASSIS

Type 6061-T6 aluminum plate, blue-anodized

DRIVE TRAIN

Type Enclosed gearbox
Primary Clutch bell/spur gear
Drive shafts Steel dogbones
Differential Ball
Slipper clutch Associated ATC
Brake Single disc
Bearings/bushings Bearings on transmission idler gear

SUSPENSION

Type Independent lower A-arm w/turnbuckle upper link
Damping Aluminum, oil-filled, coil-over shocks

WHEELS

Type One-piece dish, white

TIRES

Type Soft-compound racing tread (Pro-Line shown)

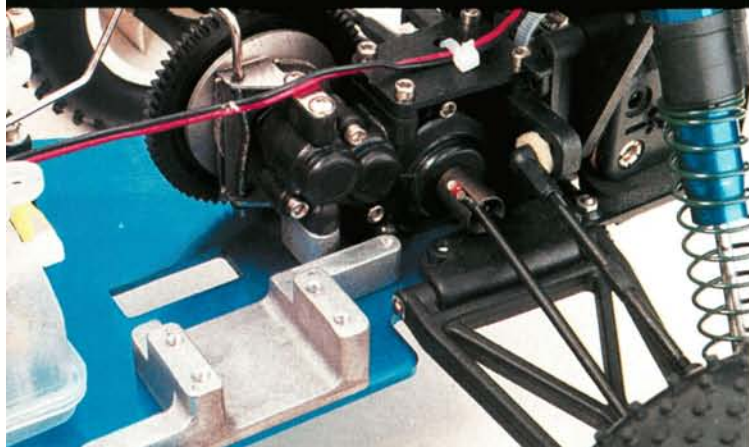
ENGINE AND ACCESSORIES (included)

Engine Associated .15
Carb Rotary
Manifold Aluminum bolt-on
Pipe Aluminum tuned type

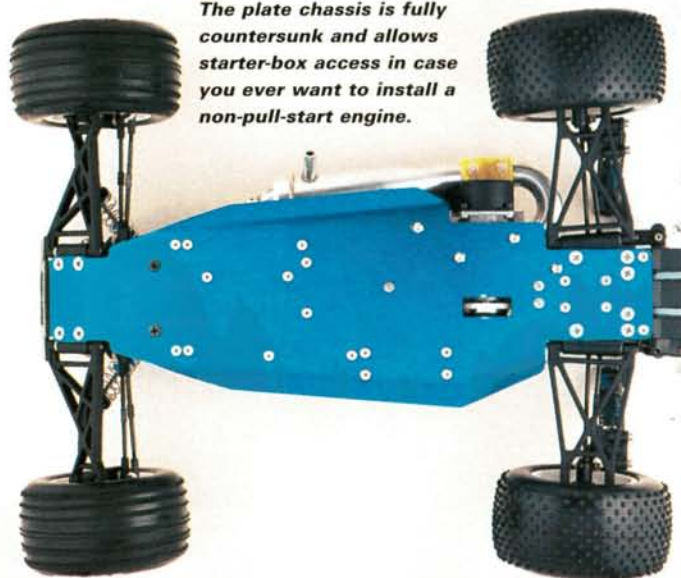
RADIO GEAR (included)

Transmitter/receiver Hitec Lynx
Steering/throttle servos Hitec HS303

The good ol' Stealth transmission hasn't been changed for the GT RTR version. That means you get the smoothest diff in RC, an automatic traction control (ATC) slipper clutch, and an efficient 3-gear design. Note the engine mount's long "arms," which help stiffen the chassis.



The plate chassis is fully countersunk and allows starter-box access in case you ever want to install a non-pull-start engine.



ALL-NEW CHASSIS

Until now, the RC10GT was Associated's tub-chassis holdout. The RTR truck marks the debut of a new plate-chassis design. The 6061 T6 aluminum stamping has slightly folded sides to increase rigidity, is constructed of best quality American alloy and features a bright blue anodized finish. The one-piece chassis eliminates the need for a separate nose plate, but the old brace tubes are intact (and are anodized blue as well). The tubes are attached to a pair of standoffs to bolster front-end rigidity.

STIFFER REAR END

The original RC10GT chassis required aftermarket attention to beef up its hind quarters. Racers noted that flexibility in the rear of the chassis allowed the gear mesh to open up, and the flexing was an unpredictable element of the truck's performance. Aftermarket fixes are widely available, but these should be obsolete when the RTR hits the shelves. A one-piece cast engine mount extends farther along the chassis to increase rigidity and simplifies engine installation—not that you'll have to worry about that, since this is a ready-to-run truck.

COMPLETE COMPATIBILITY

With the exception of some chassis parts (which will become part of a new kit GT but do not fit the "old" GT), the GT RTR's parts are completely interchangeable with current kit trucks*. If you pop an arm or need new slipper pads, your local hobby shop can sell you GT parts right off the wall. All that parts interchangeability also means the RTR truck has all the features of the

kit version, including the legendary Stealth transmission with ball differential, ATC slipper clutch, disc brake, fiberglass shock towers, aluminum tuned pipe and manifold and steel turnbuckles. Features you won't find on the kit GT that the RTR includes are the blue aluminum shock bodies. These are the same proven units as are found on other Associated truck kits, but the deep blue finish is exclusive to the RTR machine.

RADIO STUFF

You can't call it a ready to run without an installed radio! Associated turned to Hitec for the Lynx AM setup used in the GT. It's a good match; the Lynx is known to be reliable, and it's ready for racing, thanks to its dual-rate steering adjustability. Standard HS303 servos are supplied; they are less torquey than racers might like, but they're perfect for all-around use and abuse.

There's a smooth servo-saver built into the steering bellcranks to spare the steering servo when the inevitable crashes occur, and all linkages have been properly set up at the factory. All you have to do is

slide your AA batteries into the receiver battery box and transmitter, fill the tank and hit the dirt.

FACTORY PAINTED, TOO

Put away that masking tape; the GT includes a factory-painted body. The GT shell includes a full set of detail decals and will have the color scheme shown here.

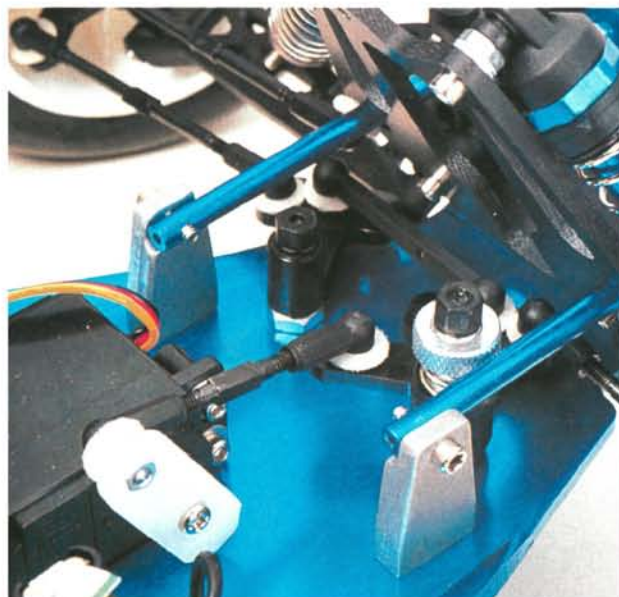
READY TO RACE?

According to ROAR rules, .15 powerplants like the GT RTR's aren't legal for competition, but that should only affect you if you plan to enter a national event. At the club level, you shouldn't have any problem racing the GT. It's fully tunable (you can tweak camber, toe-in, wheelbase, shock position, and piston type), and it includes soft-compound racing rubber, dish wheels and a slipper clutch. That's just about all the racing stuff you need. The only things you will want to add are bearings (the GT RTR has a ball-bearing idler gear but the rest of the truck uses bronze bushings), but the bushings are fine as long as you keep them lubed.

*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■



All you have to do is slide your AA batteries into the receiver battery box and transmitter, fill the tank and hit the dirt.



Left: the familiar "nose tubes" seen on tub-chassis RC10s now reach back to a pair of standoffs, since the plate chassis has no "sides." The knurled wheel on the right bellcrank is the servo-saver tension adjustment. It's also interesting to note what isn't in the picture: a separate nose plate. The RTR's chassis is one piece.

Right: nothing new in the RTR shocks' technical department; they feature the same double O-ring internals as Associated's other dampers, but the blue anodizing is new and looks killer.



AFTERMARKET

SEVEN SIGNAL CATCHERS

After a few years in the hobby, most people end up with more cars in their collection than radios. Switching the receiver from one car to another gets old fast, and it makes sense to buy another one. However, it can cost an arm and a leg to buy the same receiver as came with your radio. Many aftermarket companies sell receivers that are just as good—or better—than the one that came with your radio, and some of them are less expensive, too. This guide will help you decide which receiver is right for you.



Hitec DCX

Dual-conversion receivers have been used in the RC airplane hobby for years; now Hitec has brought that technology into the RC car hobby.

A dual-conversion receiver sends the signal through two filters instead of one, and this provides better reception with less interference—that's especially helpful for gas racers. Only Hitec's receiver crystals can be used in this receiver, and it's on the large side, but the extra security of two filters makes up for these inconveniences. Two versions of the DCX are offered: one for JR, Airtronics and KO radios and another for Futaba and Hitec units.

- Great for gas.
- Requires Hitec dual-conversion receiver crystal (not included).
- FM only.
- 3-channel.



Hitec HFS-03MC

Hitec's single-conversion FM unit is a bit chunky compared with the other receivers in this guide, but it's no bigger than the typical receiver included with a radio. All types of servo/ESC plugs fit the case, but be sure to check for correct polarity.

- FM only.
- 3-channel.
- Models to suit all popular radios.

Crystal-Less Transmitter Technology

RC airplane enthusiasts have enjoyed synthesized RF technology for a few years now, but Hitec is the first company to bring the technology to the car market. Its new Spectra Synthesized RF Module is designed to be used with the Hitec Lynx 3D radio. It is a direct replacement for the stock single-frequency module. This module does not use a radio crystal; instead, two small dials on the unit's side let you dial in the frequency to match the crystal in the receiver. Hitec crystals must be used in the receiver that you choose to use with the Spectra. The two dials are used to set all the frequencies between 61 and 90. Each dial is numbered so you can set your frequency precisely. The two dials are on the side of the unit, and once the module has been installed in the radio, the settings are concealed and protected from accidentally being changed.



RECEIVER

by Kevin Hetmanski

GUIDE



Hitec SHREDDER

This 2-channel AM receiver is the smallest, lightest receiver in the bunch; if you are looking for a receiver that fits in a small space, this is the one you want. Its smoked-plastic case allows you to see all the goodies on the inside. Mounting instructions are included.

- Small, light design.
- 2-channel.
- Available in AM only.

Q & A

Will all aftermarket receivers work with my radio?

No; you must use a receiver that is designed to be compatible with your brand of radio. Companies such as Novak offer receivers suited to single brands; other companies may have one model that works with a few brands. Just be certain that your brand is listed on the package, and you'll be all set.

Will I have better reception if I get an FM receiver?

Not if you don't have an FM transmitter! An AM system cannot be "converted" to FM by installing an FM receiver. You must stick with AM!

Will an aftermarket receiver improve the performance of my radio gear?

A new receiver will clear up any problems caused by an old, malfunctioning receiver, but if your factory receiver is functioning OK, there really isn't any benefit to swapping it for an aftermarket unit. Most racers and hobbyists purchase aftermarket receivers to outfit additional vehicles, not to replace the factory original.

Will my original crystals work, or do I need new ones?

All the receivers featured in this guide will accept your original-equipment crystals, with the exception of the Hitec DCX unit. Because of its dual-conversion technology, the DCX requires a special receiver crystal; the transmitter crystal does not need to be changed. Hitec sells individual, dual-conversion receiver crystals.

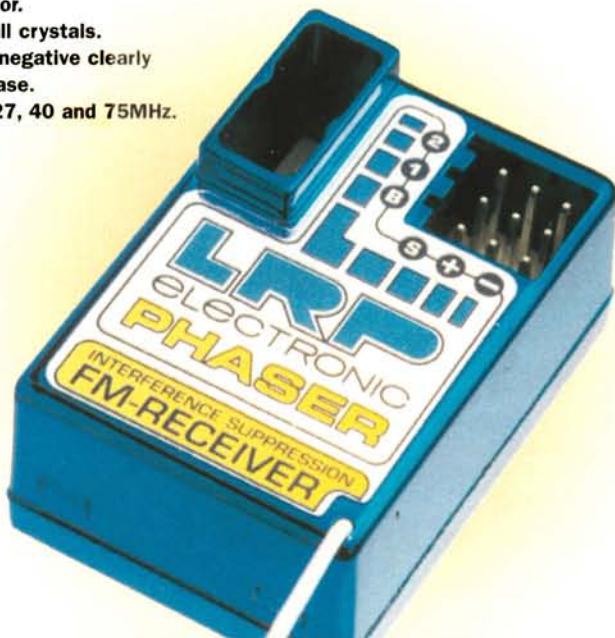
What are "channels," and why would I want more than two?

Each RC car's actions is assigned to a "channel," just as each broadcast network is assigned to a channel on your TV set. Most cars require only two channels: one for throttle/brake and another for steering. Additional channels may be used to control scale functions such as tilting the bed of a pickup truck, waving the driver-figure's arms, or performing mechanical tasks such as shifting a transmission. However, you can only use those extra channels if your transmitter supports them; if your receiver has three channels but your transmitter has only two, the third receiver channel is useless.

LRP PHASER

LRP enters the game with its new Phaser receiver. It comes in the same cool, blue chrome finish as LRP's ESCs and is available in 27, 40 and 75MHz models. To avoid mix-ups, plug polarity is clearly marked on the case. For best performance from your receiver, LRP sells 27 and 40MHz crystals that are matched to it, but the receiver accepts all standard crystals as well. The case is shielded for maximum interference protection, and colored antennas help you easily identify which band you are using. Mounting instructions, mounting tape, zip-ties, Futaba plugs and lots of stickers are included.

- Cool blue color.
- Works with all crystals.
- Positive and negative clearly marked on case.
- Available in 27, 40 and 75MHz.



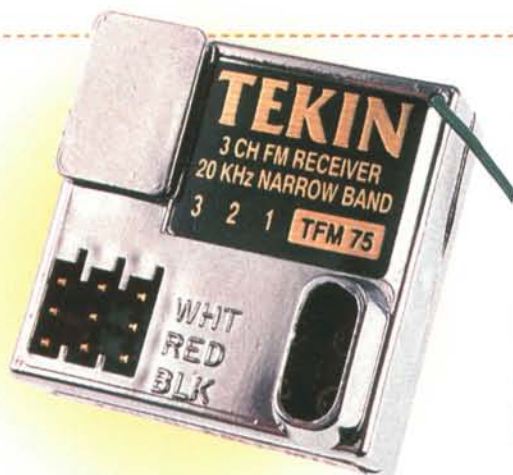
AFTERMARKET RECEIVER

GUIDE

Novak XXL

Its familiar orange color makes Novak's XXL receiver stand out in a crowd. It's offered in versions to suit all FM and AM radio systems, and this small, 2-channel receiver's frequency band can be identified by its antenna's color: 27MHz is black, 40MHz is yellow and 75MHz is green. The receiver accepts Futaba, JR, Sanwa, Hitec, KO Propo and Airtronics Z connectors. Mounting instructions, mounting tape, sticker sheet, capacitors, two JR plugs and crystal covers are in the box.

- 2-channel.
- Can be used with all Futaba, JR, Hitec, KO Propo and Airtronics radio systems.
- Compact design requires minimal chassis space.



Tekin FM MICRO CHROME RECEIVER

Yes; it looks good, but the chrome plating is there for a reason: Tekin claims it protects the receiver from electromagnetic, radio frequency and electrostatic interference. Tekin also says the chrome plating increases the receiver's range by 10 to 15 percent. The receiver's small size makes it a good candidate for use in cramped quarters. Models are available in 27, 29, 40 and 75MHz.

- 3-channel.
- Available in 27, 29, 40 and 75MHz.
- Chrome finish claimed to reduce interference.

27 vs. 75

Twenty-seven-band radio systems seem to be the choice of most racers, although it might seem unusual to choose a band that offers fewer channel options. Those in the know have good reason for doing so, however; 27-band has more "space" between the channels—40KHz, to be precise, while 75-band has only 20. This means there is less chance of getting radio "hits" from other drivers on the same band. Twenty-seven-band radios also seem less susceptible to engine "noise"—not the actual sound they make, but rather, the radio interference made by various metal parts as the engine operates. Nothing is wrong with 75-band systems, but switching to 27-band will give you a little more protection from glitches.

FMA DIRECT WARLOCK

FMA steps up to the plate with this 4-channel FM unit that incorporates "selective, microprocessor-controlled, advanced, radio transmission" ("SMART") decoding. This is a programmable fail-safe that FMA claims is better than PCM transmission.

This fail-safe system can be programmed independently for each channel. Mounting and fail-safe instructions are included. On the downside, the unit's super-long antenna is difficult to mount properly without coiling, and that may reduce the receiver's range.

- Available in FM only.
- Programmable fail-safe feature.
- Can be used with Futaba, JR and Airtronics FM radio systems.
- 4-channel.



	Novak XXL	FMA Warlock	Hitec Shredder	Hitec HFS-03MC	Hitec DCX	Tekin	LRP Phaser
AM	■	—	■	—	—	—	—
FM	■	■	—	■	■	■	■
Channels	2	4	2	3	3	3	2
Dimensions (in.; LxWxH)	1.31x1.21x.57	1.7x1.14x.75	1.44x.83x.57	1.98x1.17x.81	1.65x1.13x.71	1.25x1.23x.66	1.45x1.02x.76
Weight (g)	13.8	20.7	12	22.2	22.3	15.3	14.7
Antenna length (in.)	17 ³ / ₁₆	39	22 ⁷ / ₈	22 ³ / ₄	23 ¹ / ₂	17 ³ / ₄	13 ¹ / ₈
Single conversion	■	■	■	■	—	■	■
Dual conversion	—	—	—	—	■	—	—
Warranty (months)	4	3	12	12	12	4	3

*The addresses of the companies featured in this guide are listed alphabetically in the Index of Manufacturers on page 233. ■

1st LOOK

Ever since we showed off the prototype T-Maxx in "Inside Scoop," and Traxxas* began running its ads for the new "big truck," we've been bombarded with questions about the newest machine to come from the home of the Sledgehammer and the Stampede—two of the most popular monster-style machines ever to hit RC.

Although they were very happy with the success of the 2WD monster formula, the engineers at Traxxas had bigger plans for the T-Maxx. They decided they wanted this truck to have it all: nitro power, four-wheel drive, forward and reverse capability, plenty of speed and tons of suspension travel and ground clearance. They also wanted the T-Maxx to handle well—no small feat for a monster truck. When they had finished their planning, Traxxas' engineers discovered that they were building something entirely new; nothing like it had ever been seen before. In fact, the only things the T-Maxx has in common with other Traxxas trucks are its shocks and its engine!



Traxxas T-Maxx

by Greg Vogel

Monster tech takes a Giant Leap



WE DRIVE IT!

"Prototype" is usually synonymous with "undrivable," but Traxxas assured us we could pound on the sample truck they supplied. We had already decided to sneak in a test run, but if Traxxas was endorsing the Idea, look out!

Here are the highlights:

Yes, it's fast. When we first heard that the T-Maxx was to be powered by a .15, we thought "What, no .21?" Thanks to the truck's 2-speed tranny, the TRX .15 is able to power the big machine with authority. Undoubtedly, someone will put in a bigger engine, but the T-Maxx does not need a bigger engine. Traxxas designed the truck for .15 power, and it's a good match.

Drive it like ya stole it. The T-Maxx likes to be driven hard, and the transmission works best when you give it plenty of revs to work with. It's a monster truck, not a touring car; clamp it.

Reverse really works. We had to get used to squeezing forward throttle to engage reverse (after stopping and flipping the reverse switch), but now, we're spoiled. Unless you flip the T-Maxx onto its lid, you'll never have to leave your lawn chair to kick the truck off an obstacle. Plus, you can do reverse donuts and stuff. Be careful when steering out of backward high-speed runs, though, or you'll barrel-roll the truck.

Scale-like chassis action. When those big wheels start turning, the T-Maxx squats down and hooks up; when you hit the binders, the front end dives and the truck stops surprisingly well. The chassis motion is very realistic and much more scale than Clod-based, 4-link designs (ironic, since the 4-link design is "real truck"-inspired, whereas Traxxas took the "performance first" angle).

The best monster-truck suspension—period. Comparing the T-Maxx's super-plush setup to that of other trucks is like comparing a waterbed to the cot in the school nurse's office. You have to see it; when it lands a jump or plants a drop-off, it just soaks up the hit with no rebound or drama whatsoever. It's uncanny. Over uneven terrain, the suspension works constantly to keep the rubber on the ground. It's a lot of fun to watch the T-Maxx in action; those undulating arms are a great testimonial to the effectiveness of independent suspension.

Surprisingly nimble. Even with its sway-inducing, long-travel suspension, the T-Maxx can hustle around turns at a decent clip. Hardcore performance guys will want to fit the truck with swaybars, but most T-Maxx owners probably won't care, and who wants to compromise all that sweet suspension action?

Jump it! The T-Maxx can be skyed without complaint; with its foam-supported tires and eight oil shocks, it has all the suspension you'll need. Just be careful not to clamp the brakes before touchdown; those giant chevron tires store a lot of energy, and if you tap the binders while in flight, they'll flip the truck over in midair.

1st LOOK

SCALE 1/10
ESTIMATED PRICE \$450

DIMENSIONS
Wheelbase 12 in. (305mm)
Width 14.8 in. (375mm)

WEIGHT
Gross, RTR 137.6 oz. (3,900.96g)

CHASSIS
Type Aluminum plate with molded composite bulkheads

DRIVE TRAIN
Type Enclosed gearbox with 2-speed and reverse mechanism
Primary Clutch bell/spur gear
Drive shafts Telescoping universal
Differentials Planetary gear
Clutch Centrifugal, two-shoe
Brake Single disc
Bearings/bushings Bearings

SUSPENSION
Type Independent double wishbone
Damping Oil-filled, coil-over shocks (2 per wheel)

WHEELS
Type One-piece, molded 5-spoke

TIRES
Type Chevron tread with foam inserts

ENGINE AND ACCESSORIES (INCLUDED)

Engine Traxxas TRX .15 with EZ-Start
Carb Rotary
Pipe Molded, tuned-type

RADIO GEAR (INCLUDED)
Transmitter Traxxas Qualifier 3-channel
Steering/throttle servos Traxxas



BODY AND WHEELS

Traxxas has designed an awesome-looking, extended cab pickup truck body with sleek lines and good-looking decals. The body is trimmed to allow complete access to the fuel tank, EZ-Start jack and cylinder head. Bright chrome bumpers grace our pre-production truck, but production machines will feature a more chip-resistant satin finish. The 5-spoke wheels will also have a brushed aluminum finish (better-looking than the plating on this sample) and will be wrapped in the same foam-supported, chevron-tread rubber tires seen here.



CHASSIS

The T-Maxx is built on a 2.5mm, blue-anodized aluminum slab. The sides of the chassis plate are folded up slightly to increase its strength, and a pair of thick, molded composite rails span the bottom of the chassis and are bolted to its center. These rails further stiffen the truck and lend a subtle, ladder-like look. The T-Maxx's enclosed transmission is suspended in a large opening in the middle of the chassis and is protected by the chassis rails. Dropping the tranny into the chassis lowers the T-Maxx's center of gravity and allows the telescoping drive axles that join the front and rear gear cases to the tranny to operate at a shallower angle.

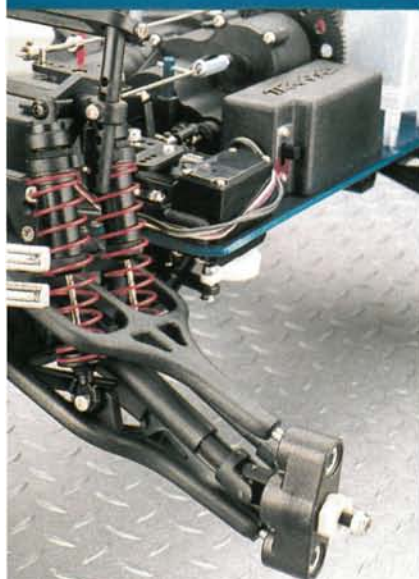
Left: long suspension arms and double oil shocks are the keys to the T-Maxx's amazing suspension. It's hard to determine the scale of the parts from this photo, but the telescoping universal joint is oversize and quite burly. Check out the pivot-ball-supported steering hub; the T-Maxx uses the same hub design on all four corners.

SUSPENSION

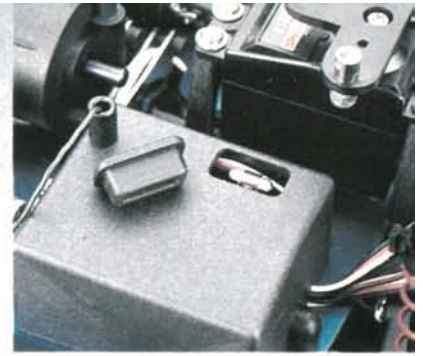
At 8.6 pounds, the T-Maxx is no lightweight, and Traxxas wisely spec'd an over-built suspension system. Deviating from the standard set by Tamiya Clod Buster-based electric trucks, the T-Maxx relies on a fully independent suspension that supports the bulk of the truck's weight, instead of using a four-link setup that merely holds the radio gear off the ground.

The front and rear suspension systems are built

around the massive, molded bulkheads that house the differentials. Each of the truck's corners employs double wishbones that are uniquely shaped to accept a pair of high-volume shock absorbers. The shocks actually pierce the upper arm and then reach up to a molded shock tower. This setup goes beyond plush; it has to be the smoothest suspension action we've felt on any vehicle. The deep, soft travel feels like a marshmallow. Truly impressive.



To keep crud at bay, the receiver is housed in a plastic box. A rubber gasket seals the box against the elements. On the other side of the chassis, another box protects the receiver batteries and switch.



RADIO GEAR

The T-Maxx will be sold complete with a 3-channel Qualifier radio and radio gear installed in the truck. The radio looks like the standard Top Qualifier radio system that comes with

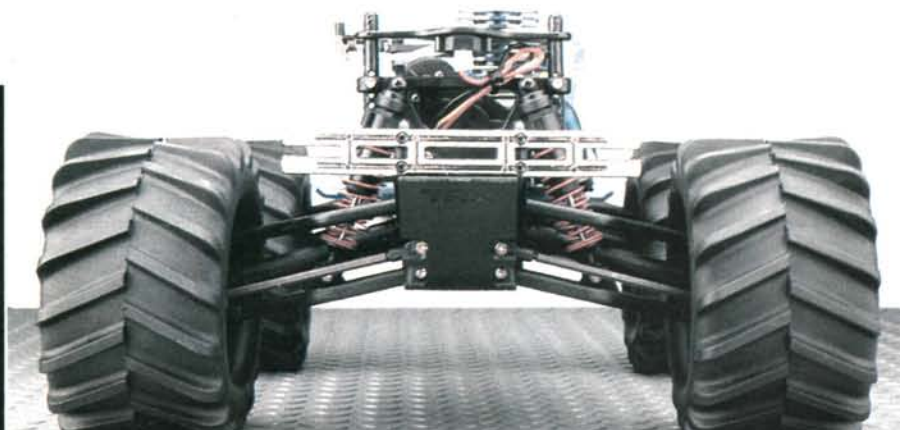
Traxxas' other vehicles, but there is a small, red switch about where you would place your thumb. This thumb switch is a third channel—the reverse switch. The included servos are the same as those found on other Traxxas RTR trucks, but the steering servo is a more powerful unit designed to deliver the torque needed to steer the T-Maxx's giant tires.

Below: the underside of the chassis is supported by these ladder-bar-like braces. Note the steering servo and pipe tip, which exit through the chassis, as well as the bottom of the tranny case and disc-brake system. By hanging these parts through an opening in the chassis, Traxxas keeps the T-Maxx's CG relatively low.



Below: even with steep arm angles, the T-Maxx's telescoping universals operate smoothly. This rear view also shows off the adjustable tie rods that permit rear toe to be adjusted. Y'know, another servo here could give the truck 4-wheel steering

Oversize pivot balls are installed at the ends of the wish-bone arms, and the front and rear hubs (they're identical) are attached with threaded-aluminum ball retainers. This is the same type of system long employed by on-road racers and now in vogue for the off-road set, thanks to the success of the Mugen MBX-4. Traxxas puts the concept to good use; the pivots operate smoothly, "slop" can be dialed out via the threaded retainers, and rear toe-in is easily adjusted.



1st LOOK

Here's the T-Maxx nose-to-nose with the ESP Clod that Kevin Hetmanski built for the new "4x4" column. The T-Maxx's body isn't all jacked up like Kevin's Clod, and that makes the Traxxas truck look smaller than it really is. The T-Maxx's wheels are a bit smaller, but check out that ground clearance; the trucks are just about dead even.



ENGINE AND ACCESSORIES

The T-Maxx is powered by Traxxas' TRX .15 engine, which includes the push-button EZ-Start system and rotary carburetor. A blue-anodized manifold is joined via silicone coupler to the molded, tuned-style pipe that vents exhaust through a hole in the chassis. Unlike other EZ-Start-equipped vehicles, the T-Maxx has a rigid mount for the EZ-Start's plug, so you won't have to deal with a squirmy plug. It just makes it that much easier to fire up the engine.

DRIVE TRAIN

The Traxxas TRX .15 engine employs a standard centrifugal clutch that mates with a slipper-clutch-mounted spur gear. You can spin the spur gear with your finger all day, and it will never rotate the wheels; that's because there's another centrifugal clutch inside the transmission housing. The truck will only move when this clutch engages; then the power of the TRX .15 engine spins telescoping universal drive shafts that mate with the front and rear differentials via bevel gears. The diffs themselves are

housed in chunky cases and feature planetary gear internals that should be just about bombproof. More telescoping universals sprout from the diffs to reach the wheels and then, the T-Maxx is rolling. The drive shafts look like those found on other Traxxas vehicles, but the T-Maxx's units are larger in diameter and all new. By the way, everything spins on large-diameter ball bearings.

But wait, there's still more to this tranny! To help the .15 engine cope with the truck's massive tires, a 2-speed mechanism is built into the gear train. A small rubber plug is easily popped out of the gearbox to allow shift-point adjustment via an Allen wrench. Suffice it to say that the T-Maxx can accelerate hard and has plenty of top-end speed. If you were among the skeptics who felt a .15 engine would not be powerful enough (confession: we were in that club), prepare to be impressed.

Now, the real star of the drive-train show: the reverse mechanism. This is actually quite simple, mainly because the designers decided to make life easy by installing a dedicated shifting servo operated by a third channel instead of engineering their way around a two-channel design. Once the T-Maxx has come to a stop, the reverse gear is easily engaged by activating the third-channel switch on the included radio. Since the reverse gear follows the 2-speed in the gear train, the T-Maxx is just as fast in reverse as it is in forward!

BRAKING

To slow the truck down before engaging reverse, the Maxx's designers integrated a single disc brake in the drive train. This safety feature should greatly extend the life of the truck's vital components, and it definitely adds to the fun of driving the beast by allowing full deceleration control. Since there is no center diff, the single disc provides four-wheel braking. A pair of steel calipers squeezes the disc via a straightforward wire linkage.

You're looking at a lot of CAD time here! The T-Maxx's tranny incorporates an internal clutch (in addition to the spur-mounted slipper), an adjustable 2-speed (the rubber plug in the case covers the adjustment port) and a reverse mechanism that is actuated by the servo that's just outside the frame of this photo.



KEEP WATCHING

It would have been easy to build a Clod clone or a buggy-based 4WD truck, but Traxxas decided to design the T-Maxx the hard way and start with a blank computer screen. The new truck represents a new role for Traxxas: that of technical innovator. The company has certainly been innovative in its marketing (which other company has pegged the needs of the entry-level/backyard-basher set so precisely?), but Traxxas vehicles have hardly been considered groundbreaking—well-designed and great values, yes, but not technically exciting. The T-Maxx changes all that; this truck breaks all the "rules" of monster-truck design yet out-performs every monster truck that preceded it. Now more than ever, Traxxas' old slogan, "The Team to Watch" holds true. We'll definitely keep an eye on Traxxas.

**Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■*



Orion *TOP Modified*

by STEVE POND

Over the past year, most of the developments in motors seemed to focus on stock-class racing. Manufacturers now appear to be turning their attention to the modified class. Toward the end of 1999, Team Orion* and Peak Performance* joined forces to collaborate on their own motor design. The result is the Sagami-made TOP motor—the foundation for the new Team Orion Chrome modified.

The TOP motor is significant because it represents a new design in a field that offers relatively few choices. Plenty of motors are available under a slew of labels, but they are all based on just a handful of original designs. This close-up look at the new TOP design reveals the technology behind Team Orion's new line of Chrome modified motors. Here are the new motor's components:

■ **CAN.** The Chrome's can starts with a 1.4mm shell that has been machined to be that thick throughout. This is to ensure that the magnetic field in the can is as strong and as uniform as it can be. Having been machined, the can is chrome plated—not the ideal coating because it traps a little more heat. According to Team Orion, however, compared with its previous motors, the airflow through this can has been improved enough to compensate for its heat retention. The can has four rather large vents in the bottom and two rows of four smaller vents through the sides.

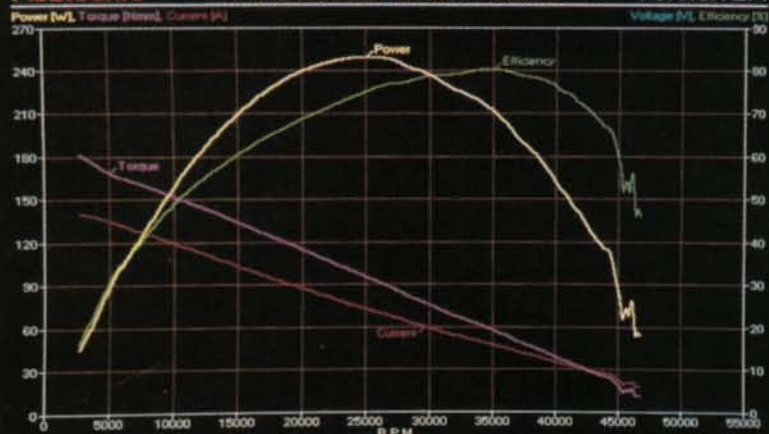
■ **ARMATURE.** The armature is a simple, full-rotor Sagami design similar to those used in the Yokomo- and GM-based motors. The armature's wire is wound in Orion's trademark pattern: around each armature pole so it's neatly stacked. The idea behind this winding is that it makes the length of the wire on each of the poles as close to identical as it can be. This should make the armature easier to balance. Balancing is accomplished by adding epoxy to the light sections of the armature, as opposed to drilling the heavy sections, to keep the armature's laminations intact.



PHOTOS BY WALTER SIDAS

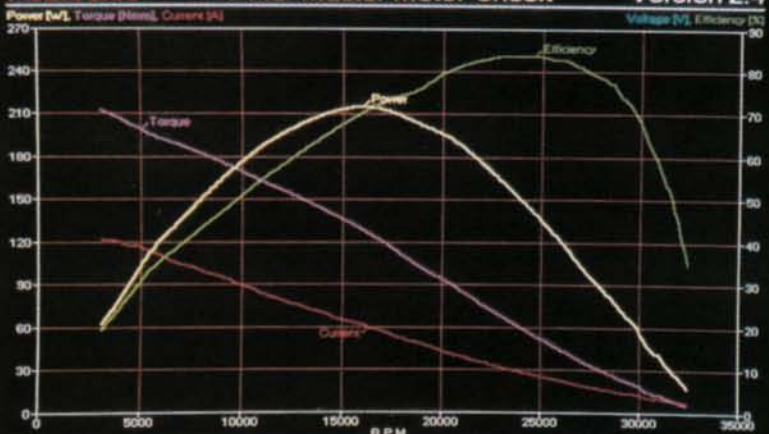
DYNO RESULTS

Robitronic PRO-Master Motor Check Version 2.4



Motor 1: Simulation, 7.5 Volts	51,342 RPM
Torque: 190.9 Nmm	Current: 143.5 A
EMF: 118.5 mV/Rpm	Resist: 12.1 mOhm
Factor: 10.65 Nmm	0.101 Nm/Rpm
Orion 1502 Chrome	22.10.1999 16:10:00

Robitronic PRO-Master Motor Check Version 2.4



Motor 1: Simulation, 7.5 Volts	51,342 RPM
Torque: 233.7 Nmm	Current: 137.0 A
EMF: 203.9 mV/Rpm	Resist: 18.0 mOhm
Factor: 3.44 Nmm	0.101 Nm/Rpm
Orion 1502 Chrome	22.10.1999 16:55:15

Two of the new Chrome motors—a 9- and a 15-turn double—were subjected to our dyno testing.

—9-turn double Chrome Touring motor. The test parameters were set to 7.5 volts, modified mode (for rpm detection) and 150A current limit; it clocked in at nearly 47,000rpm! That's an incredibly high rpm, and it requires a pretty high gear ratio to develop power in a usable range. Further demanding a high gear ratio is the low torque output of 95 Newton millimeters (Nmm). Tests of other low-turn modified motors have netted at least 100Nmm of torque, with the average closer to 115Nmm. Lower torque production is characteristic of a low-turn modified, but the 9-double seemed just a little softer than usual. Power output is healthy at just under 250 watts at 25,000rpm. Efficiency is just a tick below normal at 80 percent.

—The 15-double produced a healthy 215 watts of power at just under 16,000rpm. Torque output was very good at 129Nmm, and efficiency was in the 83- to 84-percent range. Compared with the 9-turn motor, the 15-double is obviously a better all-around motor for 2WD applications because it offers more power over a broader rpm range.

■ **ENDBELL.** The molded-framework endbell is unique. It's flanked by a pair of purple-anodized, aluminum heat sinks and chrome-plated, upright brush hoods. The brush-vibration-damping springs underneath the brush hoods prevent the brushes from bouncing around at high rpm. Color-coded brush-shunt heat sinks identify the endbell's positive and negative sides. The endbell's most unusual element, however, is a great new feature in modified motors: molded into it are a couple of small cavities, each of which houses a small, surface-mounted capacitor. This innovation eliminates the need to solder on two of the three capacitors usually recommended by motor and speed-control manufacturers. That leaves just a single capacitor (if you choose to use a third) and a Schottky diode to install. That reduces the soldering job from three or four pieces to just one or two. Non-racers may elect to simply install the motor as is, without soldering anything!

FINAL ANALYSIS

Team Orion's new Chrome motors are certainly an improvement on its previous line—so much so that the new motor captured the recent IFMAR Off-Road World Championship. Despite its chrome plating, the can stays cool because of better air circulation. Overshadowing the performance enhancements, however, is the new endbell design. The inventive minds that collaborated on the new TOP motors looked beyond the trained hands of professional motor builders and included a feature that makes an average enthusiast's life a little easier—the two built-in capacitors. It seems like an obvious step, but it took Team Orion to make it happen.

*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■

Looks good. What do you call it?

We scooped HPI's 2WD nitro-truck prototype in last month's "New For 2000" section; now HPI needs your help to come up with a name for the new machine. You could go technical with a variation of "Nitro RS4," or suggest something more personal, such as "Hank"—your call. Click over to www.hpiracing.com to cast your vote.



At last: Long-Wearing, Raceable TC Tires

Pro-Line and Team Losi have been working independently to solve the one-run-tire dilemma that plagues serious sedan racers. As these racers will tell you, staying fast means spending a lot of money on fresh rubber, and that certainly doesn't help the scene.

Pro-Line's answer is its new H13 compound, which is claimed to provide 10 times the wear of the current S3 tire compound without compromising performance. Pro-Line also says the new tires work well on carpet, are effective in temperatures ranging from 60 to 120 degrees and will cost the same as current S3 tires. Two carcass and tread types will be offered.

Team Losi's long-wear compound is simply dubbed "Yellow" and is offered as a low-profile slick. According to Losi, the rubber has been race-tested by Brian Kinwald, and he has been able to run entire events on one set of tires without sacrificing performance. According to Brian, the tires were ready to race from the first lap and actually improved with each run. The yellow-compound tires are expected to cost slightly more than Losi's other compounds, but the increase will be more than offset if they outlast just one set of "regular" tires.



New compounds from Team Losi and Pro-Line will stretch your tire budget.



Right: the 19-tooth BK gear (top) is smaller than a 19-tooth, 48-pitch gear but still has a healthy tooth profile.

Trinity "BK Pitch" Gears Now Available

Back in the August '99 issue, we revealed Trinity's plans to shake up the current gear standards of 48 and 64 pitch with a BK (for Brian Kinwald, of course) design that works out to 56 pitch. The new gears offer more gearing flexibility than 48 pitch and greater durability than 64 pitch. A full range of pinions is available, but at press time, only Losi-type spur gears are on the shelves; "standard" pattern gears for Associated trannies and direct-drive cars are on the way and should be available by the time you read this.

RACER TIP OF THE MONTH

■ Brian Write Owner, BW Raceway



To change the frequency crystal on the Hitec Lynx 3D, you must remove the module from the transmitter to access the crystal. On busy race days, you may have to change the crystals several times, and it can be a nuisance to have to repeatedly remove the module. Here's how to modify your Lynx 3D transmitter so you can change crystals without removing the module.

With a Dremel tool that's equipped with a rotary sanding drum, grind an opening on the transmitter case where the module slides in to allow frequency crystal access. If you have one of Hitec's new Spectra modules, you can grind an opening on the top of the transmitter oppo-

site the area you just modified to allow access to the frequency selection dials.



RACERnews

INNOVATOR AT WORK

Richard Royall

No matter how well thought out a new RC car design is, it seems that some areas can always benefit from a little aftermarket attention. One company in particular has a real knack for sniffing out those "soft spots" and has built a reputation for quality and durability through its unique and popular aftermarket products. That company is RPM, and its molded gear covers, tools, suspension arms, hubs and other products too numerous to mention have become staples on racers' cars and in their toolboxes. This month, its founder Richard Royall tells us about RPM's past, present and future.

Radio Control Car Action: RPM is a cool name for a company that makes exciting hop-up parts, but doesn't it actually stand for something other than "revolutions per minute"? Richard Royall: That's right; it actually stands for Rohart Precision Molds. Originally, I had a partner named Hartman, and we put our names together as "Rohart." The initials just worked out as a really neat name for our product line when we went into RC.

RCCA: Rohart Precision Molds? It doesn't sound as if RC stuff was part of the product line. What were you working on?

RR: In the beginning, we were a mold-making shop. We made molds for the plastics industry and then got into plastic injection molding after that. Before I got into RC, I made special kite winders. I made a lot of stuff for Spectra Star kites back then. We started in 1974, and 1999 marked RPM's twenty-fifth year in business.

RCCA: What ultimately drew you to RC?

RR: Back in about 1985, I bought an RC10 from CRP [Custom Racing Products]. I bought it through Roland Bailey, who worked there. We were molding wheels for Frogs and Hornets for CRP. So I bought this RC10 for my son, and it seemed really cool. He put it together and started breaking things here and there, so I started making little pieces to fix it. Then, whenever I went to the hobby shop, they'd look at the new parts and ask, "Where did you get these? You made them? Make 50



more; we'll sell them all!" So I sat down, made drawings and actually started producing some pieces. Then I got hooked up with another manufacturer who was already in the RC business and could market them. They already had contacts in the hobby

industry, so that's how I got my first products going. It just snowballed. A lot of things were needed back then, and only a few really decent aftermarket products were available.





RCCA: What were the first items you developed for RC vehicles?

RR: I made bumpers because my son needed one badly—really badly! I made the regular-size bumper and the larger, really wide bumpers for oval as well.

Right after that, I made the first front arm for an RC10—the longer front arms with different shock mounts. That was a state-of-the-art thing back then. I was selling more of those at that time than anything else. Eventually, Associated actually incorporated my entire geometry on those arms.

RCCA: RPM eventually went on to release a complete chassis kit. How did that product come about?

RR: We were negotiating with Associated. They wanted to make a new car; they were tinkering with that Stealth car that they used at the '91 Worlds, but that was a fluky kind of thing. We wanted to hit something in the middle between those two—between a regular RC10 and the Stealth car. I worked with them for a while, but they decided to go in a different direction. However, we already had the whole new front-end kit, so we went ahead and balanced it out and made a rear-end kit for installation on the RC10 aluminum chassis. Mounting it took hand work by the consumer—a lot of cutting and drilling and stuff. As soon as you start doing that, it gets a little scary for the buyer. So we went ahead and made a molded chassis to mount all those suspension components on. We actually had one of the first complete molded chassis out there! We still sell those chassis kits; I think it's the most durable car ever made. A guy called me the other day; he's had his since 1992, and it's finally wearing out; he wanted to know if we had pieces for it, and we do; we carry all the parts for it.

RCCA: Once you've conceived an idea for a product, how long does it take to go from a drawing to a product that's ready for a polybag on the hobby-shop wall?

RR: Our wheels take a little longer because we have to send them out to a vendor to get the chrome finish put on, but products can sometimes be finished in about two weeks. We had a gear cover for the Triple-X within two weeks of the initial shipping of the vehicle. When Associated made the B2, we actually had a gear cover done before they shipped it because they worked closely with us and sent us what we needed to begin developing the gear cover before the B2 was completed.



Richard poses next to his prized possession: his highly modified '69 Corvette.

RCCA: Where do your new product ideas come from? Do racers ask you to create things?

RR: We get a lot of phone calls and emails from racers and hobbyists, and we listen to what they want and need. A lot of things we can't make. We try to stay in our area and keep away from metal parts. We like to go with the injected-molded, really nice-quality stuff. We can't make everything, but we listen to the racers and the hobbyists; the guys who are out there bangin' around on the street are the ones who really need good, durable products.

RCCA: Which RPM product was the most challenging to develop?

RR: Definitely our chassis kits, because it took so many pieces to complete them; I don't even remember how many molds we had to complete to get it all to fit together. I really appreciate the work the major manufacturers do when they make a whole new car. I know what they had to go through to get to that point. It's a lot of work. There are a lot of variables; for example, determining the shrinkage of plastic really consists of just making a very careful and well-calculated guess; but it's still just a guess. Once you've built the mold, and the part is coming out too long, you have to weld up steel to correct it. When you're hitting real tolerances, it's a tough one!

RCCA: I know you wear quite a few hats at RPM, but I also know you don't do it all alone. Do you want to give some credit to some of the gang at RPM for their contributions?

RR: Atticus Overbay, my sidekick here; he's the other guy who works in the tool room with me. It's really just the two of us building the molds. We work together on designs and

everything. I draw up things on a conventional drafting board, then Atticus and I use the computer so we can start shifting things around to get the "look" and the size; everything we need is on the computer, and that's his expertise. He has been a world of help to RPM, and that's what has given us the ability to come out with some of the really nice, contoured, smooth, good-looking wheels that we've done in the last three years or so. Atticus does some really nice CNC work [computer numeric control; shorthand for the computerized milling machines used to create the molds]. That was his background before he came here, and he has gone leaps and bounds on the computer since then because of the cool software that we use. Atticus is one of those rare people who's starving for knowledge, and boy, he picks it up and retains it. He has been a real asset to RPM.

RCCA: What do you see on the horizon as far as molded technology goes?

RR: It's hard to tell; it's not as easy to come up with new products as it was ten years ago. But we're listening to the people, we're always looking for new ideas, especially more universal items such as tools rather than specific parts for vehicles, like a particular front arm. We're a bit more hesitant about those things because the market has been changing so rapidly. But we have a lot of ideas, we go to the shows, we listen to the people, and we just seem to keep crankin' out some neat stuff. It's fun; we really enjoy our work here! When you finish with something, and you see it in the magazine or hanging up at the hobby shop or in "Readers' Rides," it's a nice feeling.

RCCA: So, you guys check out "Readers' Rides" each month?

RR: Oh, yeah; that's the first thing we do. We practically use magnifying glasses to see if we can spot our parts in there! And we get a lot of compliments at the trade shows, not just from consumers but from hobby-shop owners, too. They always tell us how easy it is to sell our products because they're good-quality parts, and they feel good selling them because they know they've steered their customers in the right direction.

RCCA: I think you have the customer-satisfaction thing dialed! Thanks for hanging out with me, Richard; good luck in the future.



RACER news

Speed Shop

NXT hop-ups from Trinity and Hammad Ghuman

Trinity kingpin/ballstuds, shim kit

Speaking of the Team Losi NXT, check out this new Team Kinwald kingpin ball-stud conversion kit from Trinity*. It allows the outer upper-arm ball end to be mounted on top of the caster block instead of on its side, and this, according to Trinity, provides smoother, more consistent steering and facilitates front camber adjustment. You'll need to modify the stock caster blocks slightly by trimming off the original upper-arm mounts, but it's an easy task. The conversion kit includes the kingpin ball studs, shims and the necessary E-clips.

Off-road vehicles take a lot of abuse, and as a result, the suspension parts develop play that can cause a vehicle's handling to become inconsistent. Trinity has a remedy that allows you to take out the slack without having to buy new suspension components. The Team Kinwald suspension shim kit should be in every racer's toolbox. The kit includes shims in three diameters that you install on the hinge pins to take out the play in suspension arms and steering and caster blocks. The kit also includes silicone O-rings to install on the ball joints to remove slop and new E-clips to replace the old, worn units. The Team Kinwald suspension shim set is designed for all Team Losi, Associated and Traxxas vehicles.

Team Kinwald NXT/GTX kingpin ball-stud kit—TK5042; \$5.99.

Team Kinwald shim kit—TK3004; \$5.99.



Hammad Ghuman aluminum suspension parts

Want to beef up your Team Losi NXT or GTX's suspension? Then check out these super-strong alloy Hammad Ghuman* (HG) components. The front steering knuckles are precision-machined out of solid T-6 alloys for strength and long life. HG's alloy rear axle carriers are also machined from T-6 aluminum to ensure durability and precise bearing alignment. The rear axle carriers are available for most of Team Losi's current lineup of off-road vehicles and most Team Associated vehicles as well. In my opinion, HG's new alloy rear pivot supports (suspension-arm mounts) are works of art. They're precision-machined, light and absolutely bullet-proof! They provide two toe-in choices (2 or 4 degrees), depending on how you install the suspension-arm mounts on the chassis and are designed to facilitate engine installation and spur-gear changes. The rear pivot supports fit precisely on the NXT; however, to complete the installation on the GTX, longer MIP CVD axles that are designed for the NXT are needed. All the HG aluminum-alloy parts are designed to be light and feature an aluminum finish.

Losi NXT/GTX front-steering knuckles—part no. 4130; \$39.95 (pair).

Alloy rear-axle carriers—2300 (Associated B2, T2, GT, DS); 23003 (Associated B3, T3); 2301 (Losi XX, XX-T, XX-4); 2302 (Losi NXT/GTX); \$39.95 (pair).

Losi NXT/GTX rear pivot supports—2020; \$29.95.

Factory Team TC3 Suspension Tuning Parts

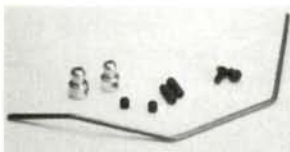
Here are some suspension-tuning parts to help you get your TC3 dialed in on any track. Associated has just released new tuned springs in three rates. The new Blue springs are rated at 17 pounds, which means they're slightly stiffer than the TC3's stock Silver (rear) springs but slightly softer than its stock Gold (front) springs. The Red springs are rated at 22 pounds, so they are slightly stiffer than the optional Blue springs. The new Copper springs, rated at 25 pounds, are the stiffest available. Now you can tune the shocks without changing the shock oil or pistons.

Need to run your TC3 on a carpet track or an extremely high-bite surface that's doused with VHT? Check out the new TC3 front or rear swaybar. The kit includes one swaybar that can be mounted on the vehicle's front or rear and all the necessary hardware and instructions. Mount the swaybar where it's needed the most

or pick up an additional one to set your vehicle up with bars at both ends. Swaybar tension is completely adjustable, and this means that only one diameter is needed to cover a variety of applications.

TC3 suspension springs—3942 (stock Silver, 14.5 lb.), 3944 (stock Gold, 19.5 lb.), 3946 (Copper, 25 lb.); \$3; 3945 (Red, 22 lb.), 3943 (Blue, 17 lb.); \$5.

TC3 swaybar—3960; \$8.





RACER news

RACER PROFILE

Bill Martinez

Team HPI driver Bill Martinez may not be well-known internationally, but he's one of Southern California's fastest touring-car racers. He also works at the HPI USA facility in Irvine, CA, so he gets the inside scoop on many of HPI's new products and is fortunate to be able to test some of them, too. Here's Billy.

VITAL SIGNS

Age: 28

Occupation: packaging supervisor for HPI

Hometown: Rowland Heights, CA

First RC car: Associated RC10

Favorite racing class: modified touring car

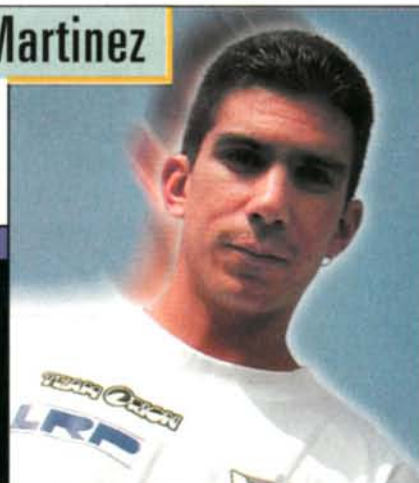
Favorite track: any track where my car hooks up

Favorite racing event: NORRCA Road

Course Nats in Las Vegas

Years racing: 12

Sponsors: HPI, Team Orion, LRP, Hitec and Robinson Racing



Radio Control Car Action: Bill, you've been working at HPI for a couple of years now. I bet people tell you you're lucky to work for such an innovative company in such a fast-paced industry. How are things going for you at HPI? What are some of your responsibilities?

Bill Martinez: Things are going great! We are working on and developing so many new and exciting products, it's hard to keep track of them all. But that's my job! I am responsible for making sure that all the new and old parts are packaged correctly. I also help out with invoices at the end of the day to ensure that everything is correctly credited.

RCCA: What do you most enjoy about working in the RC industry?

BM: I enjoy watching RC technology advance. Because I work at HPI, I get to see and experience it firsthand.

RCCA: Do you ever have an opportunity to test some of the new HPI products before they're released to the public?

BM: All the time! It's fun to go racing with parts that nobody else has. I test products to see if they offer a competitive edge. If they don't offer any advantages, I go back to the designers and engineers to find out why; that's what testing is all about. Some of the new things we're currently working on are more linear springs and lightweight ball-diff hubs.

RCCA: You're a local legend who's among the fastest TC drivers in Southern California. Can you reveal any speed secrets?

BM: I spend most of my time trying to keep my car in top working condition. I make sure that all the bearings are clean and friction free and that none of the parts are bent or broken.

RCCA: How much time do you spend wrenching on your cars every week, and how often do you practice?

BM: I'll spend however much time it takes to prepare my car for the next big race. I usually get most of my practice time in at the actual event because there are only a few on-road tracks around here.

RCCA: Gas-powered touring-car racing is really popular in California; in fact, I've competed against you on several occasions with my HPI Super Nitro RS4. Which do you prefer—gas or electric?

BM: I prefer electric to nitro because most of the really fast guys race in the electric class, and I like the competition.

RCCA: I really dig your Mitsubishi Eclipse! Did you know that our assistant editor, Greg Vogel, has a hopped-up Talon? Hmm ... I smell a race. Who knows? Maybe you two guys could race with 1/10-scale versions of your real cars. Are you a full-scale racing buff?

BM: I'm ready to race Greg Vogel—or "Swabby," as you guys like to refer to him—any time. Hey, Greg; the loser pays for lunch, OK? And keep in mind that I'm a steak-and-lobster kind of guy. Yes, I love all forms of racing, especially Formula 1. I'm on the Web every day to find out all the latest news on F1 racing. Our general manager, Shawn Ireland, is an F1 buff, too, so we're always bench racing.

RCCA: Whenever I visit HPI, the best parking spaces are occupied by some really cool sports cars. Whose are they?

BM: Company owner Tatsero Watanabe drives the Ferrari 348 Spider; general manager Shawn Ireland drives the BMW M3. The Honda Prelude and the Accord are owned by David Kouche and David Potter. And then there's my Eclipse. Oh, and we can't forget Kent Clausen's "family truckster" minivan; somebody has to drive us all around!

RCCA: What do you like to do when you're not working or racing?

BM: Well, I'm a health freak; I'm at the gym five days a week. I can also be found playing my Sony PlayStation—racing games, of course—from time to time. Most of my time, however, is devoted to my beautiful girlfriend, Angie.

RCCA: Do you have any words of wisdom to pass along to readers who are just getting started in the hobby and who might be a little overwhelmed by its sophistication?

BM: Practice! And don't go around thinking that you need all the latest go-fast goodies to win races. When you practice at the track, try to get around the course without hitting anything. You'll find that your lap times will improve if you just slow down and don't hit anything.

RCCA: Thanks again for your time, Bill; I look forward to rubbing fenders with you soon.





by Chris Chianelli

A perfect 10 in pure paradise

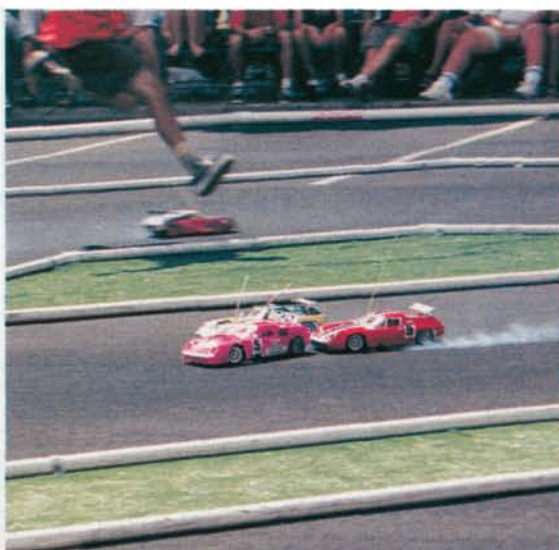


KYOSHO W



The 3rd Kyosho World Cup is the culminating event for 3,000 teams who have competed in 30 countries. The World Cup is yet another feather in Kyosho's race-event cap; it's truly a world-class happening that's unlike any other. In the words of Kyosho President Akihisa Suzuki, "The real purpose of this event is not found in the winning or the losing, but in the heartfelt enjoyment and fun competition that can be experienced with radio control racing." From the beginning, this has been Kyosho's goal, and in that spirit, the World Cup just keeps getting better.

There were 59 teams from around the world—by far the most ever—and Honolulu, Hawaii, was the perfect site in every way. The weather and the track location were perfect; moreover, this track was perfectly matched to $1/10$ -scale sedan racing. The first World Cup in the Philippines was also a gorgeous setting with a brand-new and beautiful track—but it was very large, more suited to $1/8$ -scale racing. The track in Tokyo was a more appropriate size, but the race was held in February, and it took quite awhile for the cars to get sufficient traction and hook up on the cool indoor carpet. The first two Kyosho World Cups were also resounding successes, but everything really came together perfectly in Hawaii: not only was the track the perfect size for $1/10$ -scale racing, but it had been resurfaced for the race and the cars handled very well from the moment they were dropped on the track.



ORLD CUP

AN RC WORLD SERIES

Everyone wins

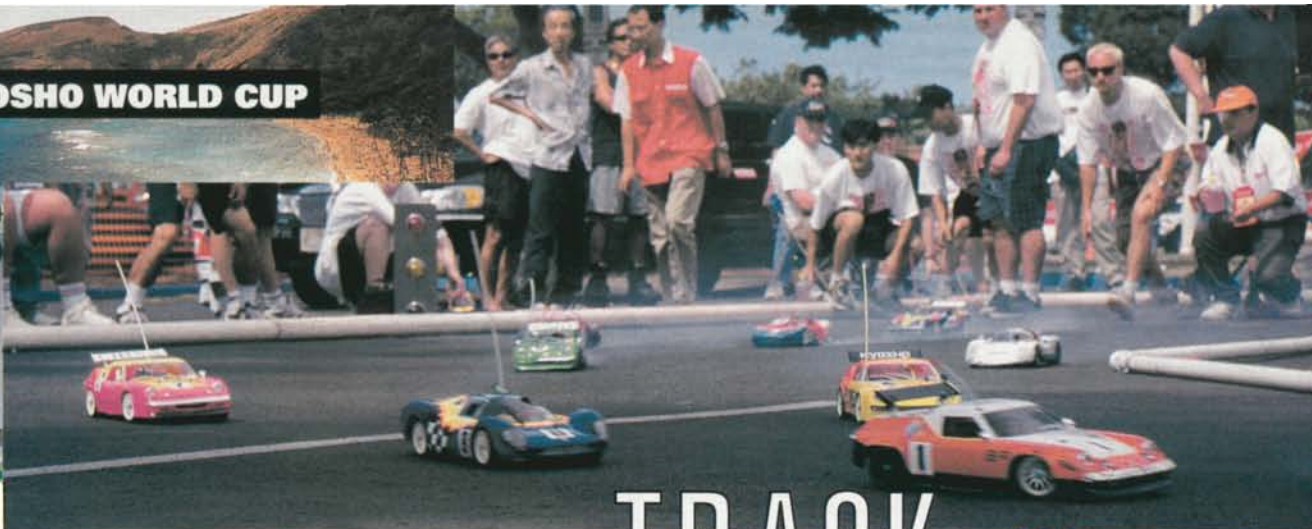
It's quite true that the Kyosho World Cup is an important race that everyone would very much like to win. Despite the competitive atmosphere, the overpowering feeling was one of universal enjoyment; the magic that comes from sharing something with 177 other individuals (who composed some 59 teams) from every corner of the earth. Just being there made you feel like a winner, and it didn't matter which language you spoke or how far you had traveled to get there. Among the teams, there was an unspoken understanding of what Kyosho was trying to accomplish with this RC "World Series," and the participants took seriously the responsibility to serve as a goodwill ambassador from whichever of the 30 countries they called home.

Yes; the race action and pit stops were undeniably intense, but when the pressure was off, the true spirit of the day was revealed beneath the pit-area tent. The warm smiles of the Swedish "A" team as they relax at their pit table (photo left) tell the story better than I ever could.

Intense race pressure and stressful pit stops notwithstanding, never did I hear an angry word (or a nasty tone) during this three-day event. The idiot politicians of this world could learn something from the World Cup!



KYOSHO WORLD CUP



THE RED KYOSHO CARPET

The moment we pulled into Honolulu's beautiful Ala Moana Hotel (five minutes from the beach, by the way), in classic Kyosho style the teams were made to feel appreciated and special. Met by the Kyosho welcoming committee, we were given room keys, breakfast and dinner tickets and welcome packets. From the welcoming dinner to the awards-ceremony dinner party on the last night, Kyosho made sure that we all enjoyed good food,

exotic entertainment and great racing that everyone had an equal shot at winning.

COOL SCALE SKINS

One of the things that makes this race so different—and very cool—is the Nostalgic Series car bodies and the PureTen chassis they run on. These 4WD PureTen nitro chassis not only hooked up very well on the new track, but they looked great sporting scale nostalgic “skins” of Ford GT-40s, Daytona Cobras, Corvette Stingrays, Ferrari 330 P4s and 250 GTOs and Lotus Europas. There were a lot of Europas. The teams seemed to love this body; I think because it has a scale and, therefore, legal rear wing. The spectacle of these aerodynamic designs of yesteryear snaking their way through the turns really adds a dimension of visual excitement to the World Cup Series that's found nowhere else.

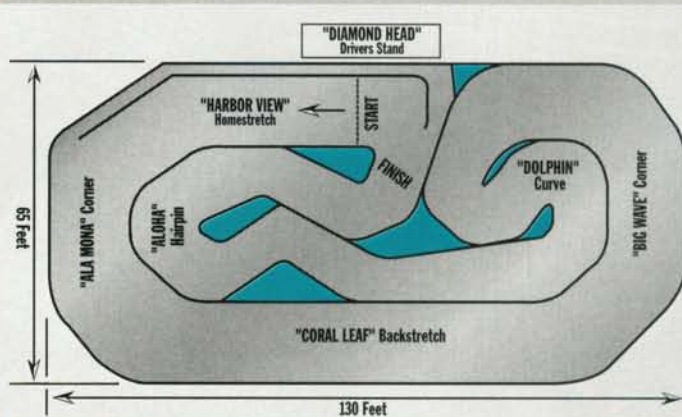
TRACK

A PERFECT MATCH

Not only was the track perfectly suited to $1/10$ -scale nitro racing in terms of size, traction and layout, but it was also one of the most awesome parking-lot setups I've ever seen. There was plenty of shade, a large pit area and roomy drivers' stand and a nicely detailed and finished infield. I particularly liked the infield AstroTurf finish because that's where I spend most of the race—on my stomach working the Nikon.

For those interested, the overall track dimensions are 130 feet long and 65 feet wide; the backstretch is about 75 feet.

Butch Farm, vice president of the 3rd KWC and owner of the Honolulu hobby shop Hobbietat, is to be commended for coordinating the site location and construction for the race.



SITE

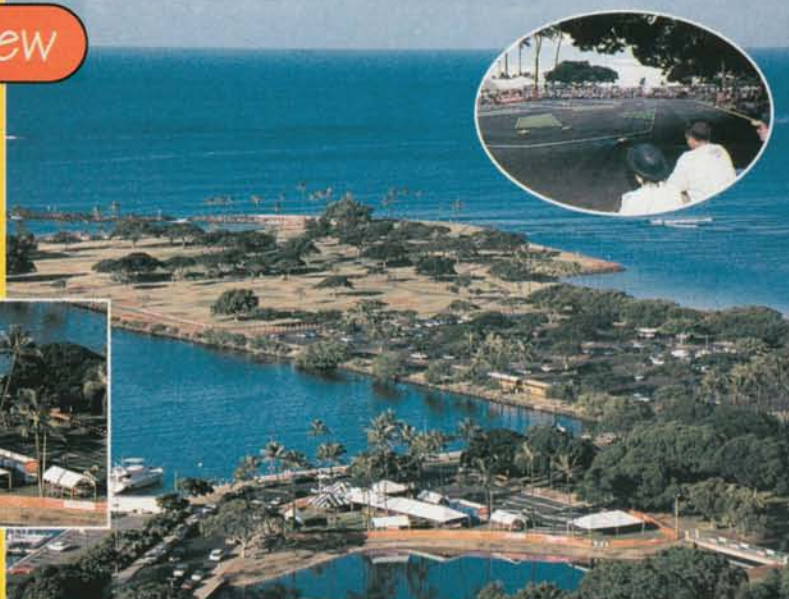
A bird's-eye view



From the balcony of my 31st-floor hotel room, you could see the absolutely idyllic setting in which the 3rd Kyosho World Cup took place. In the photo at far right, you can see the race tents at bottom center set up at the foot of the harbor. The site is in a park, a five-minute walk from the hotel, and the beach is two minutes' walk away. This was truly like racing in

paradise. In the inset photo (right), the race area is seen from the same balcony through a 300mm lens.

The little bird above (I called her Betty) joined me for coffee every morning. She put things in perspective and set each day off right. In exchange, she got more of my croissant (unbuttered) than I did—a more than fair exchange.



QUALIFICATION

Kyosho has taken extra steps to ensure that a team doesn't travel halfway around the world (albeit at Kyosho's expense) just to sit out the remainder of the race when things go awry early on. The 5-minute pre-qualifier and 10-minute qualifiers are set up so that if a team does poorly or has mechanical problems in the beginning, it is not immediately out of the action; just another example of the Kyosho staff's commitment to the enjoyment of all.

In pre-qualifying, each team runs in a 5-minute "time-attack" heat for starting position in the qualifiers. The qualifiers are a series of three 10-minute time-attack heats. Teams that score 1 through 10 advance to the A-main, teams 11 through 20 to the B-main, and the rest enter the C-main. This system is very inter-

esting: depending on how your heats go and how the scoring works out, you can be bumped up even if you aren't the fastest. I saw teams get bumped up several times right into the A-main. It's like being a "wild card"

in pro ball: everybody still has a chance. Add to this the overall fairness of the Kyosho Cup rules that regulate



The action was almost as exciting off-track as it was on-track.



Thanks to the Kyosho staff's support and coordination, mandatory pit stops and refueling went very smoothly.

A family with vision

The father-and-son team of Akihisa Suzuki (right) and his father Hisashi Suzuki are not only the men behind the Kyosho World Cup, but they founded and head up one of the most innovative hobby manufacturing companies in the world. About 4 years ago, Aki took over as president. While Mr. Suzuki remains an advisor to the Kyosho Corp., he now has a lot more time to party. And as you can see from the photo at far right, this man is a lot of fun to be around and knows how to have a good time.



STAFF

Committee of comfort and coordination



Mr. Hiroshi Kasamatsu directed team traffic to help allay any trackside confusion.



I'd like to thank Kyosho's fine staff not only for running an extremely organized and fair race, but also for conducting it in a professional yet hospitable and fun manner. This is not an easy combination to pull off, but the Kyosho staff was right on the money.



Computerized heat results were continuously updated so everyone knew exactly where they stood at all times.

Kyosho's Nozomi Terai is shown here next to KWC vice president and race organizer Butch Farm and the Suzukis. Nozomi did a fantastic job of coordinating trip arrangements and was a gracious host when we arrived. Nozomi is the best; I would have been lost without her.



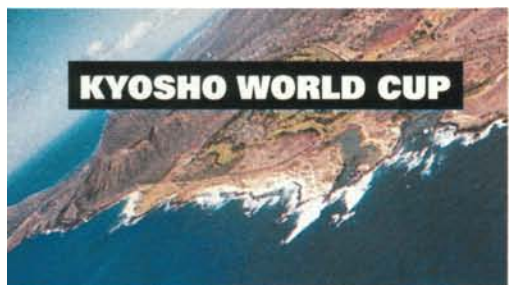
Mr. Manabu Mizota was my host during the Tokyo World Cup. Here, he is doing car and engine inspections. I think Manabu was chosen for this job because he is known as "Mr. Polite" and, if necessary, would most gently tell someone they were cheating. As far as I know, no one was.

LE MANS RC STYLE



The final event featured an across-the-track Le Mans-style running start. In this case, the pit crew, not the drivers, dashed to start the cars.

KYOSHO WORLD CUP



everything from engines to tires, and you have a race in which driver skill really is the deciding factor.

SMOOTHER AND SMOOTHER

As the competition moved through the six semifinals (two on Thursday afternoon and four on Friday morning), it became glaringly apparent that, while the cars were not going any faster, the driving was getting smoother and smoother. I'm reminded of the media race I wrote about in last month's "Back Lot" that took



TOP 10 WINNERS

POS.	NO.	TEAM	LAPS	TOTAL TIME (hr., min.)	BEST LAP (min.)
1	8	15 Germany B	202	1,6.41	16.47
2	3	28 Japan B	202	1,13.81	16.04
3	4	29 Japan C	198	1,3.32	16.45
4	6	21 Hong Kong A	198	1,9.34	16.37
5	9	34 Norway A	195	1,2.64	16.15
6	7	16 Germany C	195	1,4.44	16.46
7	1	27 Japan A	193	1,12.59	16.13
8	5	24 Italy B	182	1,7.64	17.12
9	2	53 USA D	182	1,10.02	16.27
10	10	42 Swiss A	161	1,14.53	16.74

WINNERS



The Germany "B" team took top honor with its first-place win. Here, team members pose with the absolutely gorgeous Hawaiian dancer that you've seen throughout this article. Is she beautiful, or what?



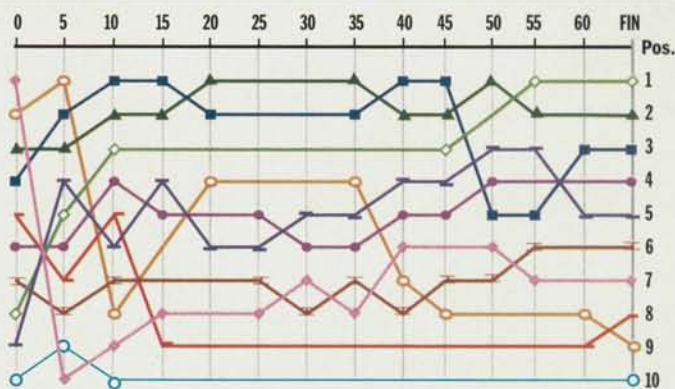
Switzerland took Concours with its "Tiger Lotus," as I call it.

POSITION EVERY 5 MINUTES



Time (Minutes)

- ◆ 27 Japan A
- 53 U.S.A. D
- ▲ 28 Japan B
- 29 Japan C
- 24 Italy B
- 21 Hong Kong A
- ± 16 Germany C
- ◇ 15 Germany B
- 34 Norway A
- 42 Swiss A





place in between the last semifinal and the main event. I had the fastest (very illegal) Quad Rider and came in dead last. Take a look if you want to see how yours truly and my cheating ways were totally humiliated. But I had fun!

By the time the main event rolled around, the level of consistent and smooth driving skill rivaled that of some of the best pro races I've attended. This world-class driving made the second half of the 60-minute final absolutely riveting! In the last 15 minutes, the lead switched from Japan C to Japan B to the German B team, which was ultimately victorious. I would like to point out that the Germans did not have the fastest car in the final. Their driving was, of course, great, but they also had one of the richer needle-valve settings that made the engine run cool and reliably. Something to think about.

FUN + PROFESSIONALISM = SUCCESS

With driver changes, pit stops, lead changes and the awesome Kyosho staff support, participation in the 3rd Kyosho Cup was exciting yet incredibly fun, according to the many teams I spoke with. I can't remember one complaint all weekend—not one. The high spirits (and

beautiful dancing girls) at the farewell awards dinner exemplified the spirit of the entire week: good-



The international spirit of goodwill evident at this event was typified by the Turkish team's banner that proclaimed appreciation for the world's assistance after two devastating earthquakes.

will and racing sportsmanship shared by people from around the world. It is an accomplishment that Kyosho should be proud of, and one that not only raises the stature of RC cars but embraces the people who love them.

I'd say that Aki Suzuki's goal of "... the real purpose is found in the heartfelt enjoyment ..." has been achieved. ■



A PAUSE FOR PEARL



If you ever get to Hawaii, do not miss seeing Pearl Harbor. The tour of the USS Missouri was fantastic. Spend a few extra bucks for a guided tour. I was lucky enough to have as a tour guide a gentleman who served on a destroyer in the Pacific during the War. His stories of the past and insightful yet laid-back reflections of the present were high points for me.



I've been all over the world and visited many wonderful places, and I've made lifetime friendships. Wonderful places and people notwithstanding, though, my favorite part of all these trips has always been coming home. Whenever this feeling comes to mind, I think as well of those who paid the ultimate price and never got to come home, such as the 1,177 who rest—hopefully, in peace—within the sunken remains of the battleship Arizona.



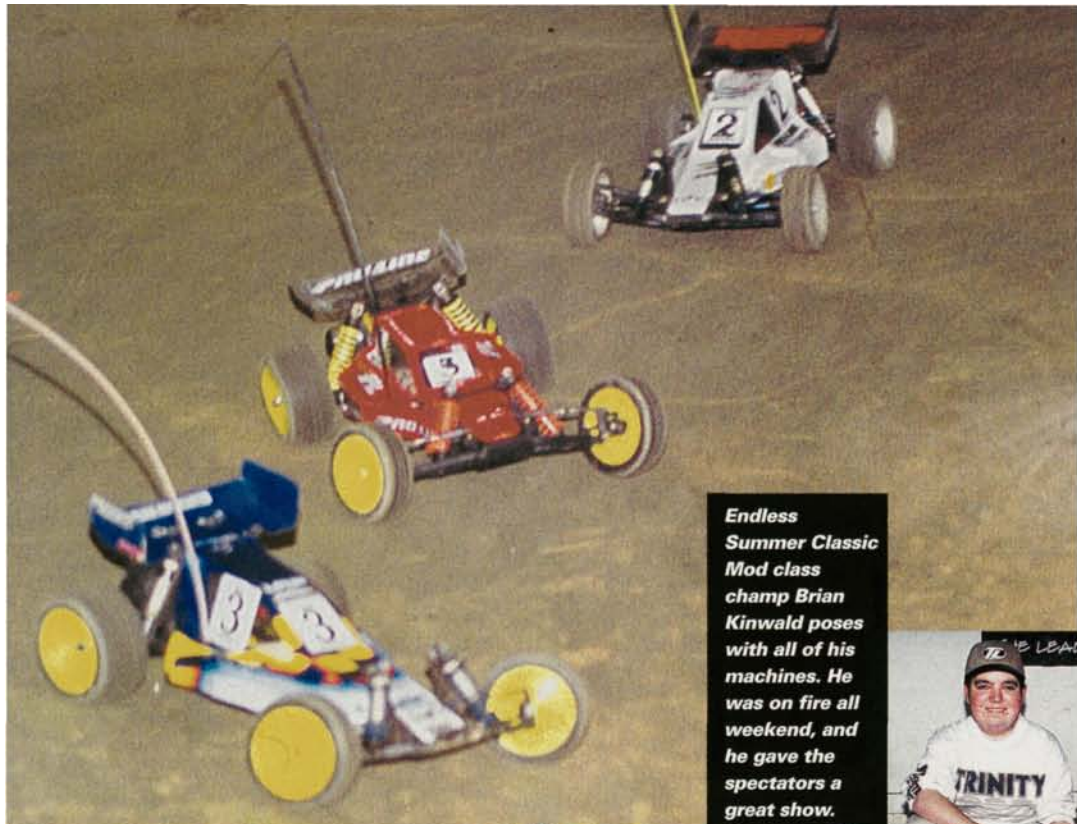
Pro-Line/RC Car Action

ENDLESS Summer Classic



The BIGGEST
little race
of the season





Endless Summer Classic Mod class champ Brian Kinwald poses with all of his machines. He was on fire all weekend, and he gave the spectators a great show.



PHOTOS BY GEORGE M. GONZALEZ

by George M. Gonzalez

NOBODY LOOKS FORWARD to the end of summer, except maybe the 250 or so racers who attend the Pro-Line/RC Car Action Endless Summer Classic every year. It is one of the few big off-road races that cater to Sportsman and novice racers, so it's always well attended. This last one was one of the largest to date, and the staff at M-n-M Hobbies in Corona, CA—the event's gracious host—had to turn away many racers because the slots filled up very quickly.

Even though the Endless Summer Classic isn't sanctioned by any RC organization, well-known RC celebrities always show up to rub fenders with the fast locals. M-n-M Hobbies is Team Trinity/Team Losi factory driver Brian Kinwald's home track, and many of the racers and spectators were there to catch a glimpse of the Great Kinwaldo in action and to take advantage of the rare opportunity to compete against a several-times IFMAR world champion. As expected, Kinwald completely dominated every class he entered, but there were seven classes, so others also made the limelight, and this race is more about the racers you don't know than about those you read about in every issue of *RC Car Action*.



QUALIFYING AND A-MAIN OVERVIEW

• **Sportsman 2WD Stock.** Nick Lefebvre took his brand-new Team Losi Triple-X to the pole position on its very first outing. He was more than 6 seconds faster than second-place qualifier Kent Schmidt who was driving a Team Associated B3. Aleks Stipicic—also driving an Associated B3—qualified third.

Nick Lefebvre took control of the Main early, and he remained unchallenged because of the giant, 16-second lead he immediately established over his nearest competitor, Bill Cook (fourth-place qualifier). Cook and Schmidt entertained the spectators with a great show as they battled for second. You already know Lefebvre won the Sportsman 2WD Stock championship, but Cook took second, and Schmidt settled for third.

2WD Stock. Dave Mangelsdorf (aka “the Mangler”) was in a league of his own. His Trinity-powered Team Losi Triple-X was expertly tuned, and as a result, he was the only driver in the class to post a 12-lap run. Team Orion driver Justin Morrison was his closest competitor and qualified second, while Team Associated/Reedy driver Andy Smolnik rounded out third.

During the Main, Mangelsdorf repeated his qualifying performance by lapping the field, again finishing with a blazing-fast 12-lap run. Smolnik ended up second, while fourth-place qualifier Jeremy Hase took third with his Team Losi Triple-X.

2WD Mod. Brian Kinwald was in the pole position, but Team Trinity/Team Losi drivers Jason Corl, Todd Hodge and Jimmy Babcock all qualified with the same number of laps—only a few seconds behind Kinwald.

During the Main, however, Kinwald shot out front and waved goodbye to his competition. The battle for second between Corl and Hodge, however, kept the spectators on their feet. In the end, Kinwald won as expected, Corl took second, and Hodge held on to third.



Local racers (left to right): Tony Limcazo, Michael Munoz, Elena Munoz and Rommel Almanza are regulars at the Endless Summer Classic.

Sportsman Stock Truck. This was one of the most popular classes—87 racers competed with hand-out motors and tires. The racing was extremely close, but Brent Newman took TQ with his Team Losi Double-XT GP. Bill Cook qualified second with his Associated T3, while Ray Velasquez (Associated) and Nick Lefebvre (Team Losi) qualified third and fourth respectively.

After a false start, the race started smoothly on the second attempt. Top qualifier Newman successfully completed the first lap followed by Cook and Lefebvre. The top three qualifiers soon spread out on the course and held their ground for approximately 3 minutes until they hit traffic.

Exiting a corner, Newman rolled his truck over; Lefebvre took the lead, and Cook claimed second. From that moment, TQ Newman ran into noth-

WINNERS



Nick Lefebvre took top honors in 2WD Sportsman Stock. The Endless Summer Classic was Nick's first time out with his Losi Triple-X!



David Mangelsdorf is the 2WD Stock champion. The winner gets to stand next to the trophy presenter.



Yes, world champ Brian Kinwald won the 2WD championship as well. Kinwald has won the Endless Summer Classic championship many times.



The two guys in the center look like skyscrapers on each side of the trophy presenter. Nick Lefebvre (right) took top honors in the Sportsman Truck.



Stock Truck winner David Mangelsdorf also won 2WD Stock, although he somehow got shuffled to the side in this photo.



Class champion Kinwald gets the center stage once again.



The 4WD A-main finalists huddle around champion Brian Kinwald.

FIN./QUAL.	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	TIRES (F/R)	GEARING
SPORTSMAN 2WD STOCK								
1/1	Nick Lefebvre	Losi Triple-X	Handout*	Trinity	Novak	Airtronics	Handout*	82/21
2/4	Bill Cook	Losi Triple-X		Trinity	Novak	Airtronics		88/21
3/2	Kent Schmidt	Associated B3	Reedy	Reedy	Novak	Futaba		81/21
4/6	Ray Velasquez	Associated B3	Reedy	Reedy	Airtronics	Airtronics		81/20
5/5	Joseph Sorochman	Losi Triple-X	Trinity	Trinity	Novak	Airtronics		82/21
6/7	Rodney Angelito	Associated B3	Reedy	Reedy	Novak	Airtronics		81/21
7/3	Aleks Stipicic	Associated B3	Reedy	Reedy	LRP	Airtronics		81/19
8/8	Kyle Newlin	Associated B3	Reedy	Reedy	LRP	Futaba		81/19
9/9	Glen Gregorio	Associated B3	Integy	Integy	Novak	Airtronics		81/20
10/10	Frank Riley	Losi Triple-X	Trinity	Trinity	Novak	Airtronics		84/21

* All racers were given handout motors and tires.

2WD STOCK								
1/1	Dave Mangelsdorf	Losi Triple-X	Trinity	Trinity	Novak	Airtronics	Losi	82/24
2/3	Andy Smolnik	Associated B3	Reedy	Reedy	LRP	●	Pro-Line	●
3/4	Jeremy Hase	Losi Triple-X	Trinity	Trinity	LRP	Airtronics	Losi/Pro-Line	82/22
4/5	Joey Stanovich	Losi Triple-X	Trinity	Trinity	Novak	Airtronics	Losi	82/23
5/8	Brandon Beckering	Losi Triple-X	Banzai	Pro-Match	LRP	Airtronics	Losi/Pro-Line	84/20
6/2	Justin Morrison	Losi Triple-X	Team Orion	Team Orion	LRP	Airtronics	Losi	84/21
7/6	Jeremy Felles	Losi Triple-X	Fantom	Trinity	Novak	Airtronics	Losi/Pro-Line	82/23
8/7	Michael Katz	Associated B3	Reedy	Reedy	LRP	Airtronics	Losi/Pro-Line	81/20
9/9	Alex Fernandez	Associated B3	Trinity	Reedy	Novak	Airtronics	Losi	81/22
10/10	Robert Kuhl	Associated B3	Banzai	Pro-Match	Novak	Airtronics	Losi	81/19

2WD MODIFIED								
1/1	Brian Kinwald	Losi Triple-X	Trinity	Trinity	Novak	Airtronics	Losi	82/21
2/2	Jason Corl	Losi Triple-X	Trinity	Trinity	LRP	Airtronics	Losi	78/21
3/3	Todd Hodge	Losi Triple-X	GM	GM	GM	Airtronics	Losi	78/23
4/4	Chad Phillips	Losi Triple-X	Team Orion	Team Orion	Novak	Airtronics	Losi/Pro-Line	82/21
5/10	Jimmy Babcock	Losi Triple-X	GM	GM	GM	Airtronics	Losi	82/21
6/8	Jason Ruona	Associated B3	Reedy	Reedy	LRP	Airtronics	Pro-Line	84/19
7/7	Derek Furutani	Losi Triple-X	Peak Performance	Peak	Novak	Airtronics	Losi	81/21
8/6	Dave Mangelsdorf	Losi Triple-X	Trinity	Trinity	Novak	Airtronics	Losi	82/21
9/9	Trevar Adamo	Losi Triple-X	Trinity	Trinity	Novak	Airtronics	Losi	82/22
10/5	Greg Monise	Losi Triple-X	Team Orion	Team Orion	Tekin	Airtronics	Losi	84/19

SPORTSMAN TRUCK								
1/4	Nick Lefebvre	Losi Double-XT	Handout*	Trinity	Novak	Airtronics	Handout*	88/19
2/2	Bill Cook	Associated T3		Trinity	Novak	Airtronics		87/19
3/6	Michael May	Losi Double-XT	Reedy	Reedy	Novak	Airtronics		88/20
4/1	Brent Newman	Losi Double-XT	Maxtec	Novak	Novak	Airtronics		88/19
5/7	Jeremy Decoster	●	●	●	●	●	●	●
6/9	Rodney Angelito	Associated T3	Reedy	Reedy	Novak	Airtronics		87/17
7/3	Ray Velasquez	Associated T3	Reedy	Reedy	Airtronics	Airtronics		85/20
8/10	Jon Eaton	Associated T3	Pro-Match	Novak	Novak	Futaba		87/19
9/8	Brad Lawson	Losi Double-XT	Birdman	Birdman	NA	Futaba		88/20
10/5	Lee Caldwell	Losi Double-XT	Trinity	Trinity	Novak	Airtronics		88/22

* All racers were given handout motors and tires.

STOCK TRUCK								
1/1	Dave Mangelsdorf	Losi Double-XT	Trinity	Trinity	Novak	Airtronics	Losi	88/21
2/2	Jeremy Kortz	●	Peak Performance	Peak	Tekin	JR Racing	Losi	88/20
3/3	Jake McGarvey	Losi Double-XT	Trinity	Trinity	Novak	Airtronics	Losi	88/21
4/5	Brandon Beckering	Losi Double-XT	Banzai	Pro-Match	LRP	Airtronics	Losi/Pro-Line	88/19
5/4	Bill Hagen	●	Banzai	Integy	Novak	Futaba		87/18
6/6	Michael Katz	Associated T3	Reedy	Reedy	LRP	Airtronics	Pro-Line/Losi	87/19
7/8	Scott Reynolds	Losi Double-XT	Birdman	Birdman	Novak	Airtronics	Losi	88/20
8/7	Bill Cook	Associated T3	Trinity	Trinity	Novak	Airtronics	Pro-Line	87/18
9/10	Eric Hase	Losi Double-XT	Trinity	Trinity	Novak	Airtronics	Losi	88/19
10/9	Brian Robinette	Losi Double-XT	Race Prep	Trinity	Novak	Airtronics	Losi	88/21

MODIFIED TRUCK								
1/1	Brian Kinwald	Losi Double-XT	Trinity	Trinity	Novak	Airtronics	Losi	88/18
2/7	Jimmy Jacobson	Losi Double-XT	Team Orion	Team Orion	Novak	Airtronics	Losi	86/18
3/2	Jason Corl	Losi Double-XT	Trinity	Trinity	LRP	Airtronics	Losi	87/18
4/3	Todd Hodge	Losi Double-XT	GM	GM	GM	Airtronics	Losi	88/18
5/4	Jimmy Babcock	Losi Double-XT	GM	GM	GM	Airtronics	Losi	88/20
6/9	Jacob Thome	●	Peak Performance	Peak	Tekin	Airtronics	Losi	88/13
7/8	Chad Bradley	Associated T3	Reedy	Reedy	LRP	Hitec	Pro-Line	81/19
8/6	Charlie Albitter	Losi Double-XT	Peak Performance	Peak	Novak	Airtronics	Losi	88/19
9/10	Scott Reynolds	Losi Double-XT	Birdman	Birdman	Novak	Airtronics	Losi	88/17
10/5	Shawn Blackwell	Associated T3	Reedy	GM	LRP	Airtronics	Pro-Line/Losi	87/17

4WD MODIFIED								
1/1	Brian Kinwald	Losi Double-X4	Trinity	Trinity	Novak	Airtronics	Losi	86/16
2/2	Chad Phillips	Losi Double-X4	Team Orion	Team Orion	Novak	Airtronics	Losi	86/18
3/3	Derek Furutani	Losi Double-X4	Peak Performance	Peak	Novak	Airtronics	Losi	84/19
4/6	Greg Monise	Losi Double-X4	Team Orion	Team Orion	Tekin	Airtronics	Losi	84/17
5/10	Derek Lamb	Losi Double-X4	Trinity	Trinity	Airtronics	Airtronics	Losi	86/21
6/5	Jason Corl	Losi Double-X4	Trinity	Trinity	LRP	Airtronics	Losi	86/18
7/9	Robert Turner	Losi Double-X4	Trinity	Trinity	Novak	Airtronics	●	●
8/8	Jimmy Babcock	Losi Double-X4	GM	GM	GM	Airtronics	Losi	84/19
9/7	Trevar Adamo	Losi Double-X4	Trinity	Trinity	Novak	Airtronics	Losi	86/18
10/4	Jimmy Jacobson	Losi Double-X4	Team Orion	Team Orion	Novak	Airtronics	Losi	86/18

● Information not supplied by driver.

ing but problems as he frantically tried to make up for lost ground and was soon in fourth behind Michael May, who came from nowhere to claim third. The race ended in this order: Lefebvre, Cook, May, after Lefebvre and Cook rolled in on what looked like a photo finish.

• **Stock Truck.** Dave Mangelsdorf was the man to beat here, too, and his smoking 12-lap run during qualifying also earned him TQ. Jeremy Kortz, driving a Team Losi Double-XT, qualified second, while Jake McGarvey, also in a Losi Double-XT, piloted his way into the third spot—a great place to start a race.

This Main didn't go as smoothly for Mangelsdorf as had the 2WD competitions because Kortz and McGarvey challenged him the entire way. These three battled it out in one of the most exciting heats: Mangelsdorf led most of the way, but a mistake put him behind Kortz for a few laps until he came back to finish first. Kortz secured second after scrimmaging with McGarvey the entire 4 minutes. The racers finished in qualifying order.

• **Mod Truck.** Kinwald was the fastest in this class, too, and it wasn't a surprise that his teammates Jason Corl, Todd Hodge and Jimmy Babcock were his closest competitors. They qualified in the same order as they had in 2WD Mod, and that singled them out as the fastest drivers at the Endless Summer Classic.

Kinwald was not challenged during the Main event and easily won the race and lapped the entire field. Once again, the battle for second held the spectators' interest. This time, it was Team Orion driver Jimmy Jacobson and Corl who went toe to toe (it's always exciting to watch drivers from opposing teams battle it out). Jacobson won that small battle and was awarded the second-place plaque. Corl had to settle for third, but his plaque was the same size as those of the top winners!

• **4WD Mod.** Kinwald dominated in this class, too, and his name on the top of the qualifying order didn't surprise anyone. Team Orion/Team Losi driver Chad Phillips and Peak Performance/Team Losi driver Derek Furutani's names appeared right

below Kinwald's in the qualifying order. The top 10 qualifiers all finished on the same lap as the leaders.

Kinwald once again shot out in front and never looked back. He had to look in front, however, because he lapped the entire field, including the second-place car that was pursuing him. Phillips secured

A professionally managed racing venue

The Endless Summer Classic is run by professionals who know how to organize and operate large races. ROAR/IFMAR rules are enforced and an AMB lap-counting transponder system keeps track of the lap times. IFMAR starts ensure that drivers race against the clock and not against one another during the qualifying heats, and for a glitch-free environment, all transmitters are impounded during the qualifiers and Mains. Additionally, to keep things fair, each car must pass a technical examination before each heat.

The hobby shop is always stocked with spare parts, and M-n-M Hobbies carries performance-enhancing accessories and many exotic parts for Losi and associated vehicles. Vending machines fully stocked with soda and bottled water are on site, and you'll always find soap and paper towels in the restrooms—small details that are often overlooked. Several video games, pinball machines and a foosball table are also available, and many heated battles were waged here during the event.

Pro-Line and Reedy sponsored the Sportsman Stock classes in which all contestants were given Reedy Rage handout motors and a complete set of high-quality Pro-Line racing tires that hooked up incredibly well on M-n-M's unique clay track. Contestants had four qualifying rounds to put in their best run. The winners were decided in a single Main during a fast-paced racing schedule, and everyone went home at a reasonable time.

ALL THE COMFORTS OF HOME

The M-n-M Hobbies blue room. What do you do when you realize that you spend more time at the track than anywhere else? Although the word "therapy" comes to mind, there is another alternative: rent a private room at the track to store all your racing gear and customize it to your liking. Local racer Derek Lamb did exactly that; he struck a deal with M-n-M Hobbies track owner Joe Stanovich and rented a storage room next to the track. Derek and his lucky friends are the only people who may use the private pit room; otherwise, the door is kept locked.

As the photo shows, the room is equipped with all the essentials. A wall-mounted air conditioner keeps it cool during the hot summer months, and a small refrigerator stores refreshments and other perishables for the racers' eating and drinking pleasure. The room is carpeted, and there are pit tables and four cushy chairs. The walls are covered in royal-blue velvet, which gives the room a regal look for a pimped-out appeal, depending on how you look at it. Some of the RC vehicles that hang from the ceiling are raced from time to time; however, a few just "hang around" on display or have been retired. I spotted a couple of classic RC cars.



The soundtrack for success. To keep his skills sharply tuned, Brian Kinwald spends countless hours a day practicing at the track, so he decided he might as well be comfortable there. Kinwald enjoys listening to music, watching movies and playing video games (like most other young adults), so he

hailed his home-entertainment system to the track to keep himself and all the other regulars entertained while charging up batteries and wrenching on rides. As you can see, Kinwald is quite the audio/video buff; he has a 32-inch monitor, a Dolby Surround Pro-Logic sound system, a Sony PlayStation and satellite TV! No wonder he's so popular at the track!



second pretty much unchallenged because third-place finisher Furutani immediately settled on a groove that was a few seconds off the pace Phillips had established.

FINAL THOUGHTS

The Endless Summer Classic was fun and exciting. The M-n-M Hobbies staff did a fantastic job of running the event, which was appreciated by all the contestants and spectators. Congratulations go to all the '99 Endless Summer Classic champions, and we'd like to thank all the racers. Hope to see you all next year. ■

Checklist for a cranky 2-stroke

Two-stroke glow engines are very simple machines. If you don't count the carburetor, they have only four internal moving parts: the piston, wristpin, connecting rod and crankshaft. If you're having problems with your engine, and by the emails I get, I know some of you are, just go through this checklist, and you should be able to identify the problem. Remember, while these are simple machines, they are still built to very close tolerances. Accordingly, you should treat them with respect and keep them as clean as you can through periodic maintenance.

FUEL TANK

Is the fuel still good?

Nitro fuel is hygroscopic. That means it just loves water and will actually pull moisture out of the air if it isn't well sealed. Always tighten the cap securely before storing your fuel, and keep it in a dry place where the temperature and humidity are more consistent. Leaving fuel, even in a sealed plastic bottle, in the garage where it might be exposed to drastic seasonal changes is not the best idea. If you suspect your fuel is bad (and if it spent the winter in the garage, it probably is), replace it.



Is the tank installed properly?

Some fuel tanks are designed to operate only when oriented in a certain direction in the vehicle, and performance suffers if they are installed "backwards." However, this problem generally does not appear until the car is on the track, and it does not affect starting. What will affect starting is improper fuel-line hook-up; if the fuel-feed nipple is connected to the tuned pipe instead of the carb, your engine won't run. Make sure the nipple that is lowest (or connected to the lowest pick-up inside the tank) is connected to the carb and that the nipple on the top of the tank or in its lid is connected to the pressure fitting on the pipe.



Are the fuel lines in good shape?

It takes only the tiniest pinhole anywhere in the fuel line to create an air leak big enough to make your engine run like garbage. When in doubt, replace the fuel lines. It's cheap insurance.

CARBURETOR

Is the carb well sealed?

Check out the June '99 installment of "Piston Power" for the scoop on sealing your engine and carburetor. While I feel the procedures detailed in this column are nothing to be afraid of, if you aren't confident about disassembling your engine to seal it, at least make sure the carb's fuel nipple is tight; if you can rotate the nipple or the needle assembly by hand, it's too loose.



Is the mounting screw tight?

Some carbs thread a screw into a tapped hole in the carb's base; others use a clamping key setup. No matter which setup your mill has, be sure the screw or nut is tight. If the carb has an O-ring that is meant to seal against the top of the engine's case, be sure it is pressed tightly to the case before you tighten the screw.

**Just use common sense and remember:
if fuel is getting to the carb, the plug is
good and your starter battery is fresh,
the thing has to at least start.**

Are the needle settings in the ballpark?

For most engines, the high-end needle should be bottomed out then opened two turns, and the low end should be set so it is flush with the carb body. These settings should be close enough to allow the engine to start; if it doesn't, go a little leaner (turn the needles clockwise).



Have you set the idle opening correctly?

With the throttle at neutral or with any amount of brake applied, the throttle-barrel opening should be at least 1mm and no more than 2mm. If the carb is closing completely, it will shut down the engine.

GLOW PLUG

Is the plug installed correctly?

The glow plug must seal against the cylinder head for the engine to run. To do that, it must not be cross-threaded, must have the copper gasket washer in place, and must be tightened snugly. Be careful, however, not to overtighten. If your engine is acting up, the first thing to try is a new plug. Even if your old one is glowing, it might still be defective. If you install a new plug, and the engine still doesn't operate properly, at least you can eliminate the plug and move on to the next stage of troubleshooting.



Is it the correct type for your engine?

Don't install a "turbo" plug (identified by its conical element shroud) unless your engine calls for it; chances are, it doesn't. When in doubt, ask your hobby shop for help, and make sure they know you're using the plug in a car. Airplane plugs may have the right thread, but the similarity ends there. Make sure you have the correct plug for your brand of engine.

Is the plug operating properly?

Remove the plug and attach it to your glow-starter; the plug's element should glow almost white hot; dull orange or red isn't hot enough. The plug may be bad, but it's more likely that your glow-starter needs recharging. If the plug doesn't get hot (or doesn't glow at all) with a freshly charged glow-starter, junk the plug.

If your engine is acting up, the first thing to try is a new plug. Even if your old one is glowing, it might still be defective. If you install a new plug, and the engine still doesn't operate properly, at least you can eliminate the plug and move on to the next stage of troubleshooting.

PISTON AND SLEEVE

Is there resistance at TDC when cold?

If you can easily turn the engine's crank when it is at room temperature, you need to replace the piston and sleeve. When cold, it should be a bit difficult to turn the engine past top dead center (TDC) — the position where the piston is at the top of the cylinder. At the very least, there should be a good "pop" as the piston reaches and passes TDC.

Are the piston and sleeve installed properly?

Most engines have a tab or a roll pin in the case that fits into a notch on the sleeve to prevent it from being assembled incorrectly; others simply have an indexing mark without a mechanical fail-safe. Double-check to make sure you haven't slid the sleeve into the case improperly. Also check the piston; some have cut-outs in the skirt area called piston skirt bypass porting. These holes must face the intake side of the crankcase and not the exhaust side. If the piston is reversed, the side without the holes will cut off ports in the sleeve.

EXHAUST SYSTEM

Is the pipe or manifold plugged or kinked?

If your problems start after a crash, check the pipe's "stinger" for a plug of dirt, grass, or the turn marshal's foot. Also check the manifold for any kinks; it's a rare thing, but you never know.

Is the pipe properly fitted with a pressure tap?

If you installed your pressure tap with JB Weld*, be sure you didn't accidentally plug it with the stuff. The engine will start without exhaust pressurizing the tank, but it sure helps when the pressure is there.



STARTING SYSTEM

Is the crank turning in the right direction?

If you use a starter box, make certain it is turning the fly-wheel in the correct direction and is not trying to start the engine backwards. If you have a pull-start, make sure it is turning the crank; if you took it apart and installed the one-way bearing backwards, the crank will not turn (and the string will not retract). If the string goes in and out but does not crank the engine, the one-way bearing is shot.

There are other things that can ruin your day out racing. Just use common sense and remember: if fuel is getting to the carb, the plug is good and your starter battery is fresh, the thing has to at least start. If it starts but doesn't continue to run, start from the beginning of this article and go through each step once again. This ain't brain surgery; it's just a glow engine with four internal moving parts!



*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■

Get your race Clod dialed in to win

Hello; welcome to the first installment of "4x4." Every month, I will discuss various topics relating to trucks—everything from building custom monster trucks to hopping-up your stadium-style race machine. If it has a flatbed, I'll be talking about it in this column.

GETTING STARTED

Most people who are involved with RC have at one time owned a Tamiya* Clod Buster. Once it's out of the box, the truck is usually modified considerably by adding aftermarket accessories. Chassis and suspension kits from companies such as ESP* and Bennett Equipment* are very popular and make a much more capable platform to build on. You can buy anything from a welded-steel-tube frame chassis to one made of aluminum. You can even scratch-build your own. Most of these kits use four-link suspension systems that give the trucks better articulation and increase their handling capabilities. Whichever chassis you choose, you'll need to know some basics to get it up and running. This month, I'll show you how to get the most out of your aftermarket Clod.



Here is the official 4x4 Clod. Get used to seeing it; this will be the test bed for a lot of monster-truck parts. Kudos to Motion Graphics for the "hot" paint job.

SHOCKS

Shocks are usually the first things you look for; for this application, choose a long shock because it will allow the truck to have more suspension travel. A long shock is also good because you can change the amount of down- or up-travel by adding spacers,

depending on your application. Try using a shock that has about 1.3 inches of travel or a total length of about 4 inches.

A Clod has little sprung weight, so you'll want to set up your shocks on the light side. This will allow the axles to move more freely. Free-moving axles will give that monster much better handling by keeping the tires on the ground, where they belong. When you fill the shocks with oil, start in the 30WT range and proceed from there.

One mistake that some people make when setting up the suspension is that they try to match the color of the shock springs with the paint scheme without considering that the springs are colored to indicate their rate, and not merely for fashion. Depending on which

spring you use, this could affect the handling of the truck. Different colored springs have different tensions that can make the suspension too stiff or too loose. If you don't care how the truck handles then use whichever spring you want. If you want to get a little more out of your truck's suspension, though, try starting with a "medium" spring (see the spring-rate chart). With the truck ready to run, set the ride height so that the truck's suspension sags slightly when you put it down.

MOTORS

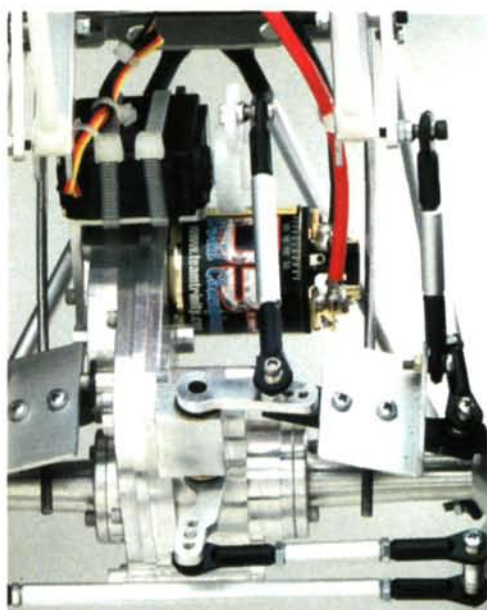
When choosing a set of motors for your truck, remember: you'll need one with normal rotation for the front gearbox, and one that is reversed for the rear gearbox. Just reversing the wires on the motor can affect the timing, and your motors will not be in sync. Although there are stock motor options, you can buy a good, machine-wound modified for the price of some of the stock motors available today. When it comes to modifieds, I suggest starting in the



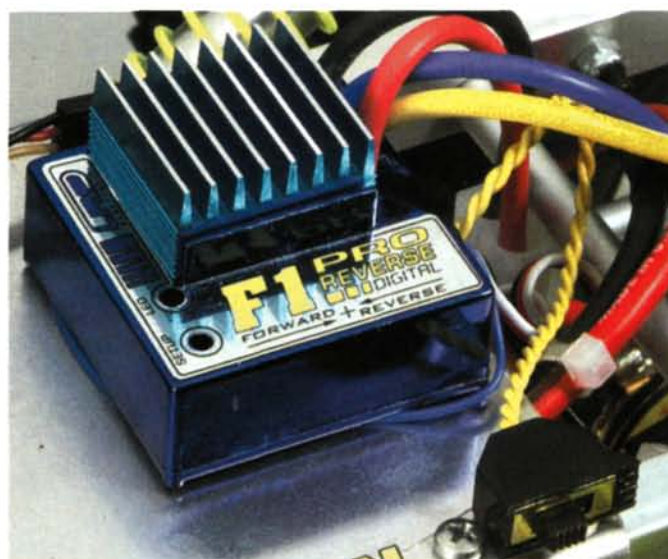
Notice that the wheels are not turned as much in the rear as they are in the front; this is the ideal setup for 4-wheel steering.



Mount the shocks upright on the cantilevers. Any air in the shock will rise to the top and, when the shock is extended, will keep the piston in shock oil. When you mount the shocks upside down, the piston floats in an air bubble, and this results in inconsistent damping.



Set up the steering with a lot of throw in front and just a little in the rear. (To reduce throw, mount the steering link in a hole that is closer to the servo's output shaft.) This servo-saver from JPS* has many mounting holes for the servo and steering links. This gives you a wide range of steering combinations so you can get the most out of your truck.



My truck's LRP F1 Pro ESC can handle some pretty hot modifieds. Novak and Tekin also offer monster-compatible ESCs.

16- to 17-turn single range. This motor range provides more speed than stock motors and won't suck the juice out of your battery as fast as some of those crazy mods will. The rear motor can be reversed by loosening up the endbell and turning it 180 degrees. It's OK to do this if your motor has zero degree timing, but if it has any more than that, you'll have to work a little harder. Loosen up the endbell and turn it 180 degrees, then set the

timing to the negative side of the 0 mark. For example, if your motor is set to 27 degrees of timing, you will set the reverse motor to *negative* 27 degrees of timing. Some motors have timing marks, and these make it easy to set the timing. If your motor doesn't have timing marks, use a small, flexible metric ruler to measure the distance between the mark on the can and the 0 mark; then set it the same distance away on the nega-

tive side of the 0 mark.

SPEEDOS

When you use two stock motors, you will be able to use most types of speedos. Modifieds, however, require more careful selection.

Use a speedo that doesn't have a motor limit; it should handle most mods without a problem. If you dip below the 12-turn mark, look for a speedo designed to handle that kind of load. Good choices for

these types of applications include the Novak* Super Rooster and the Tekin* Titan. If you're using a different brand or model of ESC, check the instructions for dual-motor compatibility.

SERVOS

When you set up your truck, your choice of servo is probably the most important decision you will make. A servo with little torque is not going to cut it. Monster trucks

SPRING-RATE GUIDE

The springs are listed from "soft" to "hard"; the larger the number, the "harder" the spring.

Color	Rate/stiffness
ASSOCIATED	
Black	1.74
Green	1.90
Silver	2.10
Blue	2.55
Gold	2.75
Red	2.95
LOSI	
Gray	1.6
White	1.8
Yellow	2.0
Pink	2.3
Red	2.6
Orange	2.9
Silver	3.4
Green	3.7
Blue	4.1
HPI	
Yellow	Soft
Blue	Hard
Black	Medium

SHOCK LENGTH/TRAVEL GUIDE

Some companies list their shocks by overall length; others list them by travel. For best all-around performance, look for a shock with about 1.3 inches of travel, or an overall length of about 4 inches. Shorter shocks may be used on flatter courses to help limit chassis roll and increase cornering grip.

Part no.	Description	Travel or length (in.)
ASSOCIATED		
6420	Shock set, rear, standard	1.32 travel
6421	Shock set, front, standard	1.02 travel
6431	Shock set, rear, hard anodized	1.32 travel
6432	Shock set, front, hard anodized	1.02 travel
LOSI		
A-5001	Shock set w/hardware	0.9 travel
A-5020	Shock set w/hardware	1.2 travel
A-5033	Shock set, hard anodized w/hardware	0.9 travel
A-5034	Shock set, hard anodized w/hardware	1.2 travel
HPI		
A773	Sport shock set (62-87)	3.4 length
A775	Sport shock set (70-103)	4.05 length
A723	Super shock set (62-87)	3.4 length
A735	Super shock set (70-103)	4.05 length
PROGRESSIVE		
EDC-2001	Associated	4 length
EDC-2002	Associated	3.75 length
EDC-2003	Associated	3.5 length
EDC-2004	Associated	3 length
EDC-2010	Losi	4 length
EDC-2011	Losi	3.5 length
EDC-2012	Losi	3 length
DURATRAX		
DTXC3500	Competition shock	3 length
DTXC3501	Competition shock	4 length

Check out a company called Chrome Tech USA. They have chromed some small parts for me, and they do a wonderful job. Give Robert Shebilske a call at (608) 274-9811. He can give you the lowdown on the whole chroming process, and I know he'll be happy to help you.

RC Car Action
100 East Ridge
Ridgefield, CT 06877-4606 USA



A circular logo with the words "TRICK" and "TRUCK" curved along the top and bottom edges, respectively. A black diagonal banner across the center contains the word "STUFF" in white capital letters.

Sassy Chassis is back and under new ownership and offers many aftermarket products for the Tamiya Clod Buster and the Kyosho USA-1. Check out these axles for the USA-1; they are direct replacements for the weak, flexible units that come stock with the truck. They combine stainless-steel axles connected to Traxxas slider shafts with a T6 aluminum spline piece at the end. These axles are longer than the stock units so they can be Instructions are included to show you how to Chassis, 1932 22nd Ave., Kenosha, WI 53140

with 4-wheel steering. It's nice, too, because you can set it up to have a little or a lot of steering; with 2-wheel, you are limited. If you go with 4-wheel steering, use a large servo-saver in the front and a small one in the rear so the front steering servo has more throw than the rear.

*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■



As you can see, the Sassy Chassis axles are beefy units. They are spring-loaded to keep the spline at the end in the gearbox throughout the suspension travel of the truck.

are longer than the stock units so they can be used with Sassy Chassis' optional, longer, lower, aluminum A-arms. Instructions are included to show you how to cut them down to fit the stock truck. For more information, contact Sassy Chassis, 1932 22nd Ave., Kenosha, WI 53140: www.sassychassis.com.

164 RADIO CONTROL CAR ACTION

Form Racing/Kyosho GP Spider 4-Stroke Conversion

by Steve Pond

I was bitten by the 4-stroke bug on my visit to Japan in May '99, when the folks at O.S. Engines* were kind enough to let me wring out a 4-stroke-powered Kyosho* SuperTen at their factory test track. After my subsequent test of the SuperTen Four II, I was totally hooked on 4-strokes!

It isn't the 4-stroke's power or performance that fuels my enthusiasm, though a 4-stroke can usually match a 2-stroke on any track; instead, it's the 4-stroke's radically different sound, look and driving "feel" that really do it for me.

During the same trip to Japan, I ran into the guys from Form Racing. They have developed a 4-stroke conversion for the Kyosho GP Spider MKII—a smaller, more nimble car than its big brother the SuperTen. Next project: 4-stroke GP Spider MKII!

The platform for the conversion was a Kyosho World Cup Spider MKII project car that I completed months ago. I built it just before the introduction of the World Cup Edition, which includes just about every option I put on my own car; my car is equipped with everything, including a graphite upper plate and shock tower, a heavy-duty aluminum lower chassis plate, aluminum oil shocks, ball diffs, heavy-duty pulleys ... well, you get the picture.

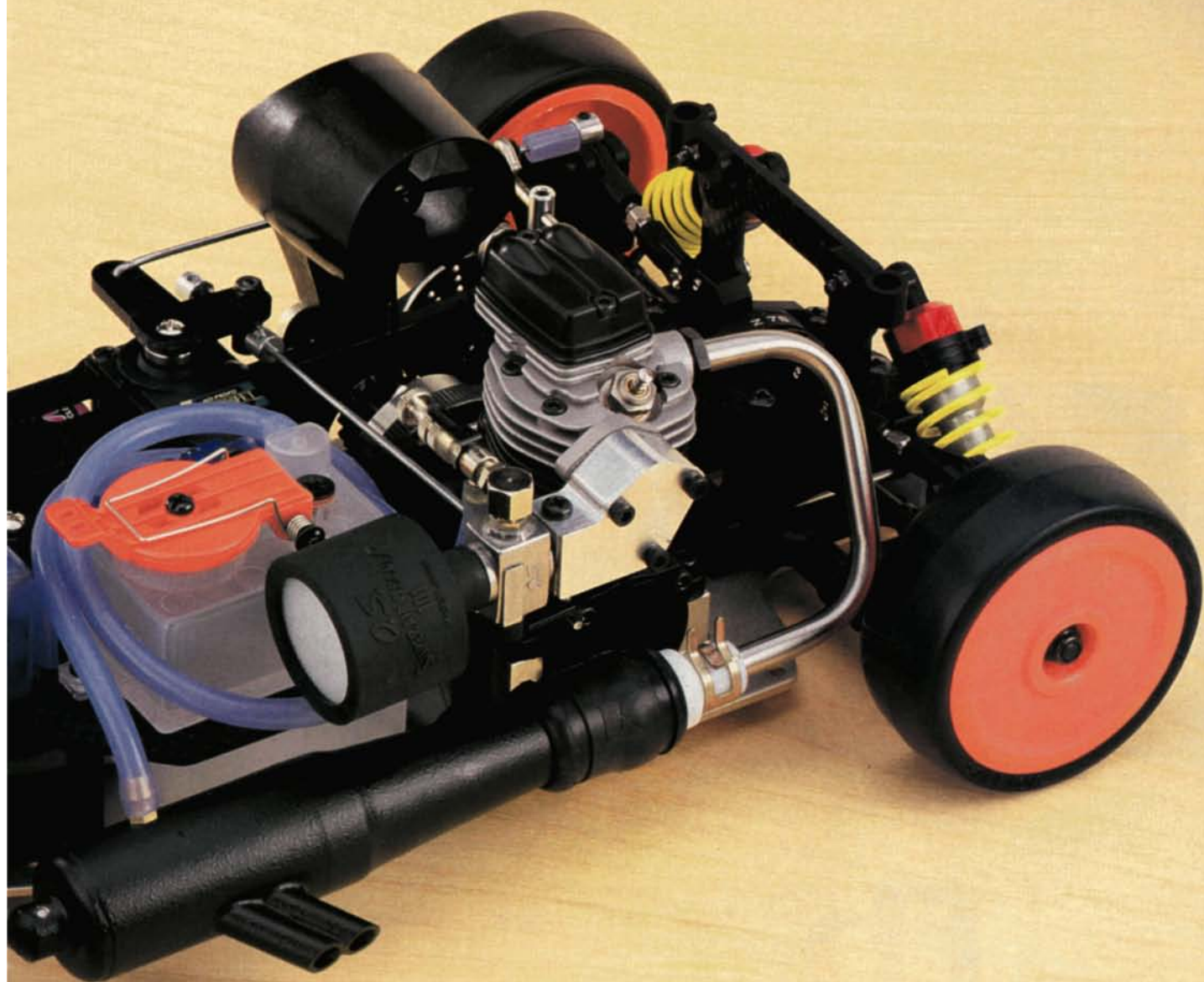
The engine for which the conversion was designed is the same as that used in the larger Kyosho SuperTen Four II—the O.S. FS26S-C. It can almost be installed right out of the box, but the carburetor's mixture needle is fixed at a 90-degree angle to the carb's bore. The mixture needle on the SuperTen Four II's O.S. 1AB carb is mounted on a 90-degree fitting to make the mixture needle parallel with the carburetor bore. This keeps the mixture needle out of harm's way. If you attempt this conversion on the Spider, you might have to swap the carb for one that's similar to the one used for the SuperTen installation.



SEEKING A CONVERSION!

First, remove all the components that won't be needed when you've completed the conversion. I stripped out the stock Kyosho GS-11R engine but left the stock mounting plate. The GS11-R has unique mounts cast in its block, but the mounting plate also has holes for conventional mounts. This makes it possible to use any Kyosho chassis instead of having to buy yet another aftermarket one.

Next, I replaced the gear shaft with a precision-machined unit from Form. The purpose of the new shaft is to adapt a 2-speed transmission, but the optional tranny for the conversion is not the same as those available from Kyosho for the Spider. The Form tranny is



The Spider gets stroked!



Left: custom linkage had to be made to complete the installation of the 4-stroke engine. A Z-bend tool, a couple of 2mm linkage-rod sections and 10 minutes are all that you need to complete the job. Above: Form's optional 2-speed transmission rounds out this conversion; it's strong and very smooth. Note the relocated rear brace rod, which was originally near the transmission—too close to the new gears of the Form 2-speed.

more similar to those designed for the SuperTen. The 2-speed intended for the Spider can barely withstand the punishment of the more powerful 2-strokes; forget the wrenching torque of a 4-stroke. Once the new shaft has been installed, it's pretty easy to drop in the new transmission.

The conversion requires a subtle modification to the stock rear bulkhead brace. The new tranny brings the gears too close to the brace that spans the top of the rear bulkheads. The tab to which the stock rear chassis-brace rod is attached must be cut away



Precision-machined engine mounts make the conversion a snap. They perfectly position the engine for a quick installation.

and the rod reattached to the center of the brace. At this point, I decided to go with titanium links all around. I picked up a Lunsford* linkage kit for the Spider from the hobby shop, but I had to pick through the box of loose linkage rods to come up with one that's suitable for the rear chassis-brace rod. This wasn't truly necessary, but my pickiness got the better of me, and I couldn't leave one steel rod on the car with all that nice lookin' titanium (call me weird!).

• **Engine installation.** Before installing the engine, you must install all the engine hardware. Held in place with a machined-steel pilot shaft made especially for the 2-speed transmission, the heavy steel flywheel is notched to fit the crankshaft perfectly and doesn't have a tapered collet like those used on many 2-strokes.

The clutch shoes slip over pins that are threaded into the back of the flywheel. The clutch shoes are rather large compared with what I'm used to in $\frac{1}{10}$ nitro touring cars, but the grunt of a 4-stroke demands something a little stronger and heavier.

The last engine piece to be attached is the clutch bell. This has a larger diameter to cover the larger clutch shoes, and it's vented to keep the clutch cool. I elected to install Kyosho's optional cooling fan for the GP Spider; to use it, I had to install a drive pulley on the end of the pilot shaft. The fan kit

includes two pulleys of different sizes: smaller for 2-stroke applications, and larger for 4-strokes.

Installing the engine is pretty simple: just attach the mounts and slide the engine into place. You'll have to make some minor adjustments to set the gear mesh properly, but basically, it's as easy as installing any other engine.

Finally, install the exhaust system and hook up the servo linkage. The manifold and optional Form 4-stroke pipe are easily installed. The pipe includes a wire mount that has to be bent to position the pipe properly; the rest is screws and zip-ties.

• **Radio installation.** This is a little more time-consuming because there isn't any available preformed linkage. I picked up a Z-bend tool and a couple of linkage rods. It takes just a moment of careful planning to make sure the bends go in the proper locations, but from there on, it's a standard linkage job.

Then I gave the GP Spider KO Propo* PS-2001FET and PS-2004FET high-performance servos, a Futaba* 3PJS radio system, a Mugen* 1000mAh receiver pack, Cross Racing* wheels, Yokomo* Beltec Sprint tires and a Kyosho Viper body.

Just before I ran the Form 4-stroke Spider, I perused the O.S. engine's instruction manual. For my previous runs with the 4-stroke in other applications, I used 20-percent-nitro

This Touring



Visit the Serpent website at www.serpent.com

fuel. According to the O.S. manual, however, the engine can run with up to 40-percent nitro! The manual also recommends fuel with 18 percent lubricant. I decided on Trinity's* 35-percent-nitro Monster Horsepower fuel, which is described as having 12 percent lubricant—lower than is recommended for that engine, so I'm not advising you to follow my example, but I feel that's enough lubricant to get the job done without compromising performance.

AND THEN ...

Running the GP Spider MKII with a 4-stroke engine is something everyone should experience. The power of the FS26S-C is impressive in the SuperTen; it's downright madness in the Spider. It's pretty rare to see a four-wheel-drive touring car wiggle as hard as this car does under acceleration, but the overwhelming torque of the FS26S-C pushes the drive train to its limits.

The tires can barely stick to the ground when the tranny jumps into second gear—even with the taller ratios required when running a 4-stroke. It's rather surprising at first, but once you get a handle on it, there isn't a 2-stroke-powered car in the world that will keep pace with this thing coming out of a corner.

As equipped, my converted Spider has rather mild gearing for a 4-stroke. The final drive ratio in first gear is similar to that of a

standard car with a single speed. Second gear, however, jumps to an aggressive 4.10:1 final drive ratio—an excellent gear choice for racing that limits top speed to just under 40mph. Installing the tallest gears available will push speed past the 50mph mark.

Fuel economy with the 4-stroke is stellar—12 minutes of hard driving! (almost double the run time of a thirsty 2-stroke of half its displacement). Idling is excellent; the O.S. FS26S-C can idle as long as the fuel lasts; it doesn't load up like the smaller 2-strokes and has only one mixture needle to adjust. The beauty of it is that having only one mixture needle doesn't compromise performance as it does in a 2-stroke engine. I know this article isn't about the engine itself but about installing it in a Spider, but in my book, this makes the conversion very worthwhile.

So, will a 4-stroke make that much difference in competition? No. Driving skill still wins out over everything else. All other things being equal, though, a 4-stroke-powered GP Spider can run past a 2-stroke-equipped version, but that in itself is not reason enough to switch to a 4-stroke. Add to this performance gain, ease of operation, reli-



A new intake manifold gives the FS26 that "diesel" look. It not only looks great, but it also relocates the carb to a safer position, where it won't be snapped off the engine when you rub the wall.

ability and the unmistakable thumping sound of a 4-stroke, however, and you have all I need to say, "Yes! Convert!"

Form Racing's products don't yet have a U.S. distributor, but it's sure to be only a matter of time. It's a unique product line and of very high quality, as shown by the conversion kit and other options I used to build my 4-stroke-powered GP Spider MKII. Everything went together very smoothly and operated flawlessly. If you have a desire to drop a 4-stroke in a GP Spider, or any other touring car for that matter, try to get your hands on some of this Form Racing stuff; you won't be disappointed!

**Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■*

Car Bites!

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Build a Battery Dumper

by Kevin Hetmanski

Get more from your packs with this simple device



To keep your Ni-Cd battery packs running strong for a long time, the cells must be completely discharged before they're recharged. If a pack is routinely recharged after being only partially discharged, the cells will develop "memory" and the pack's power and run time will suffer. In simplest terms, the pack "remembers" that it is usually recharged after being depleted to a certain voltage, and it does not perform as well if you try to drain it past that point.

To get the most out of your packs, you should "train" them to deliver all the power they can hold. That's why it's important to fully discharge (dump) your packs before you recharge them. To ensure the best pack performance, dump the cells at an amp rate that is close to what the cells encounter in a race; typically 20 or 25 amps. To supply that type of load, common automotive taillight bulbs are a compact and relatively safe solution. Assembling your own bulb discharger isn't difficult or expensive, and you'll get more life out of your packs. Here's how to do it:

YOU'LL NEED

- **Ten no. 1157 dual-element automobile taillight bulbs.**

Each bulb draws about 2 amps, so 10 wired together will give you a 20A load. Make sure you get the 1157 bulbs with two elements; a very similar, single-element bulb is available, but it will not draw the same amperage and is actually more expensive!

- **A good 40W (or higher) soldering iron.**

Eight-dollar cheapie irons won't work well; invest in a high-quality pencil-type iron from Ungar, Weller, or Craftsman. If you have a gun-style unit, that will work well, too, but if you plan to buy an iron, get the pencil type.

- **A piece of scrap wood to act as a jig.**

Find a piece of wood that is about the same width as the bulbs' bases, long enough to hold 10 bulbs and thick enough to drive a nail into; ideal dimensions are 1x1x7 inches.

- **Two flat-head nails.**

- **About 2 inches of fuel tubing.**

- **Hammer.**

- **Paste or liquid soldering flux.**

- **60/40 rosin-core solder.**

- **3 feet of flexible, silicone wire (12 to 14 gauge).**

1 Preparation

Plug in your soldering iron and let it get really hot (skip this if you have an on/off soldering gun). While it's heating, clean the brass bulb bases with steel wool or a Scotchbrite pad to allow the solder to bond more effectively, and prepare the soldering jig by slipping a piece of fuel tubing over a nail and driving it into one end of the wood base. Slip another piece of tubing over the other nail and keep it handy.



PHOTOS BY WALTER SIDAS

HINTS

- The bulbs will get very hot in use, so be sure to use the discharger only where the bulbs won't hurt anyone or melt anything.

- When the bulbs start to dim, disconnect the battery pack from the discharger or you will over-discharge them. You can also prevent this from happening by installing a voltage cut-off device between the bulbs and the battery; this device will automatically shut off the battery when its voltage drops to a preset level (usually 0.5 volt per cell). Deans®, Pro-Match® and others make effective units.

- Be careful when storing and transporting your discharger; those bulbs are glass, after all. If you break a bulb, carefully unsolder it and throw it away responsibly.



2 Solder the bulb bases

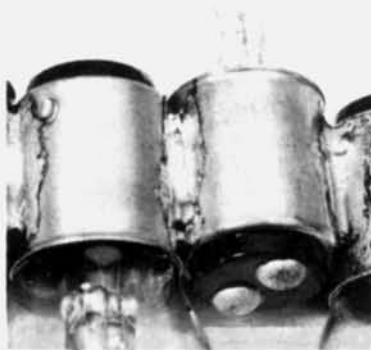
Place the brass base of one bulb against the nail, then position another at 180 degrees from the first bulb, making sure their brass bases are flat against each other. Pin the bulbs together by tapping the other nail in behind the second bulb. It takes only a tap or two to drive the nail in far enough to hold the bulbs together; you don't have to pound it in. The fuel tubing provides a little spring action to help hold the bulbs together.



Turn the bulbs so the terminals on the bottom are angled as shown in the photo; this will make it easier to solder them together later. Now you can solder the bases together. I like to apply a little flux to the brass first because it helps the solder flow into the joint. Using a hot soldering iron, add plenty of solder to join the two bulbs. Once the solder has cooled, turn the assembly over and solder the other side.



Next, pull out the nail, put down another bulb at 180 degrees from the second bulb, and repeat the process until all ten bulbs have been soldered together in a line along the board.



Brush some flux onto the exposed wire, and apply solder before attaching it to the terminals; this will make it easier to make a good joint.

Repeat the soldering and wrapping until you have soldered all the terminals together, but don't cut off any excess wire yet; you'll need it for the next step.

Repeat the soldering and wrapping until you have soldered all the terminals together, but don't cut off any excess wire yet; you'll need it for the next step.

4 Add a connector

You'll now use the excess wire that hangs off your bulb discharger to hook up a connector. Just trim off the excess so that you have two equal lengths, and solder the free segment to the brass base of the last bulb. You can now install the connector of your choice. I prefer to use a connector on my bulb discharger because it allows me to plug the discharger into a pack directly. For hard-wired packs, I use a set of alligator clips with a connector that I plug into the discharger. If you wish, you may simply attach alligator clips directly to the discharger. Don't worry about polarity when you install the connector; for the record, the brass bases are negative and the terminals are positive, but the discharger works no matter how it is hooked up.



What about my Radio Ni-Cds?

If you use rechargeable batteries for your receiver and transmitter, you can maximize their run time by fully discharging them, just like your car packs. However, 20 amps is too high a discharge rate; 1 amp is much more appropriate.

To make a transmitter/receiver pack discharger, you'll need one, 1156 single-element automotive lightbulb, and a female plug to match the male plug on your receiver and transmitter packs (your local hobby shop should have these). If your transmitter uses individual cells instead of a pack, visit your local RadioShack and buy a battery holder for 8 "AA" batteries; it will be prewired to accept the plug of your choice.

To complete the discharger, just solder one lead of the female connector to the bulb's base and attach the other to the terminals. Plug in the pack you wish to dump, and disconnect it when the bulb dims. Simple.

3 Solder the bulb terminals

With all the bulbs' bases soldered together, it's time to connect the terminals. Strip $\frac{1}{2}$ inch of insulation off one end of the 3-foot wire and solder it to both terminals.



Having soldered the wire to the first bulb, wrap it around to the terminals on the second bulb, but don't cut the wire; just strip a section of insulation off the wire so it can be soldered to the terminals.

Having soldered the wire to the first bulb, wrap it around to the terminals on the second bulb, but don't cut the wire; just strip a section of insulation off the wire so it can be soldered to the terminals.



Pro Match Smart Tray II

Battery care used to be easy: it was basically, "Dump pack; put pack away." Now electric racers are more concerned than ever with squeezing every last volt out of their cells, and there are new tools to help them do just that. The most common is the discharge tray, which is used to equalize the voltage in the cells before they're charged. Pro Match* has just introduced a second version of the Smart Tray (appropriately, if not cleverly, named Smart Tray II), which has some interesting features that make it easier to use—and use properly—than other trays I've tried. Interested?

FEATURES

The Smart Tray II is built on a thick slab of a circuit board that is definitely sturdy and the steel clips and thumbscrews that grip the pack are also burly. Seven LEDs are wired into the board: five to indicate the pack's voltage and two for the correct installation of the pack.

The five green LEDs wink out as the cells' voltage drops. Two red LEDs, one stationed at each end of the pack, light up only if the pack fails to make proper contact with all the tabs. Once installed and humming along, the Smart Tray II dumps each cell with a resistor. A Schottky diode prevents the cells from going into reversal, so you can safely leave them in the tray as long as you like.

DOES IT WORK?

Frankly, there's no way this thing can't work; it's dirt simple and performs as advertised. After dumping off a 2000mAh pack on my old set of 1157 bulbs (by coincidence, there's a how-to on constructing an old-fashioned bat-

tery-dumper in this very issue), I put the still-warm pack into the Smart Tray II. After 45 minutes, the cells were equalized.

SHOULD YOU BUY ONE?

If you need a battery tray, there's certainly nothing wrong with the Smart Tray II. It isn't the most exotic piece of gear, but neither is a good soldering iron nor a decent pair of pliers. It's a functional tool, and that's all it's meant to be.

Part nos.—6001-S (standard tray) shown above; 6001-R (reverse tray) for packs with left-side positive tab.

Price—\$32.99.

—Peter Vieira



Likes

- Durable, no-nonsense construction.
- Foolproof LED display for pack installation.
- Also works with 4-cell packs.

Dislikes

- None.



Trinity Anaconda Wire

Time to replace the wires on your speedo? This is perfect. It's 100 percent copper and tinned for easy soldering. It's also very flexible, which makes it great for electrical installations and routing around tight chassis components.

• Anaconda Wire—5152; \$5.29.

GS Racing Graphite Boost Bottle

Boost bottles are a great way to smooth mid-range throttle response while slightly increasing low-end punch. General Silicone, now known as GS Racing*—the manufacturer of all those dazzlingly colored silicone products—offers a boost bottle that's stylish and functional. Its chamber is a woven carbon-fiber tube with aluminum end caps that come in three colors, and the package includes all the hardware necessary to hook it up to your engine. Our bottle didn't seem to hamper

performance, but we didn't notice any measurable performance gains either. It sure looks cool, though.

• Boost bottle—GSB00510 (end caps in blue, purple and burgundy); \$8.99.



Trinity Pit Bag

Heavy metal toolboxes and tackle boxes are the pit boxes of the past. Here's a really convenient, stylish way to haul your gear—a durable nylon bag with heavy-duty handles, full-length zipper and Trinity* logo.

Three cardboard storage boxes fit snugly inside, and the bag won't collapse when you remove them.

• Pit bag—9125; \$45.



Novak Dually Dual-Profile ESC

Although most of the racers I encounter who use Novak* Cyclone and Atom ESCs admit that they don't fully exploit their ESC's programmable functions, they all agree that there is a discernible difference—and advantage to be had—when driving with a “profile” that is well-matched to the conditions at hand. Novak's latest racing ESC, the Dually, makes it easier than ever to tailor an ESC to your needs because it has two built-in profiles that address the most basic car-setup option: stock or modified motor. Since I race both classes, the Dually seemed like a great choice for me. Here's what I discovered.

FEATURES

• **CLC 111 Current Limiter.** A simple potentiometer allows you to dial in the current limiting you need to tame a slippery track or to conserve battery power. The Novak system is not “smart,” however; it will limit your top speed if you dial it down too far. For maximum punch, you can turn the limiter off. I have to confess that I'm a “limiter off” kinda guy, but I'm going to use this simple tuning aid more often; so should you, especially if you have trouble making run time.

• **Polar Drive Technology.** As the frosty name suggests, Novak's proprietary circuitry is designed to improve efficiency and promote cool running. When I get my degree in electronics engineering, I'll explain *how* this works; until then, I'm telling you it *does* work. The Dually is a cool customer, even with low-wind mods in big-amp applications.

• **Digital Anti-Glitch Circuitry.** Novak claims that this circuitry helps prevent radio hits. Granted, I do run a PCM radio, but the Dually, like other Novak ESCs I've used, did not create any radio gremlins.

• **Radio Priority Circuitry.** When you ignore my advice on employing the current limiter and your car is dumping on the last lap (“I'm in first. Now I'm in sec ... oops, make that third. Is it me, or is this track getting bigger by the second?”), Radio Priority makes sure you have full steering control, so you can limp across the line instead of cutting slo-mo donuts.

• **One-Touch Setup.** You're not really in the ESC business these days if you don't offer some type of push-button setup. Novak's system is simple and foolproof: press the button until the LED is a steady red; hold at full throttle until it turns a steady green; hold at full brake until it blinks green; return to neutral, and wait until the LED is a steady red again. That's it.

MANUFACTURER'S SPECIFICATIONS

Input voltage:.....4.8 to 8.4 volts (4 to 7 cells)

Case size:.....1.63x1.72x0.65 in.

Weight w/o heat sinks:2.1 oz.

“On” resistance*:0.0007 ohm

Rated current*:400 amps

Braking current*:100 amps

BEC volts/amps:6/3

Current limiter range: 20to100 amps/off

Stock profile min. drive/frequency:.....
6%/1000Hz

Mod profile min. drive/frequency:
3%/7800Hz

*at 25 °C transistor junction temperature.



• **Modified/stock profiles.** Once you've dialed in the ESC with the One-Touch Setup button, press and hold it again until it lights steady green (it will light red first), then release it. If the LED blinks slowly, you've got the “stock” profile. If it blinks quickly, you're in “mod.” If you don't have the setting you want, just press the One-Touch Setup button. When you've got the setting you need, leave the ESC alone until the LED lights a steady red again.

• **Other stuff.** Naturally, Novak includes three 0.111 microfarad capacitors to set up your motor, purple heat sinks (you may need to crimp these for a tight fit) and an assortment of receiver-input plugs for KO, JR, Futaba, Hitec and Airtronics radios. Don't look for a Schottky diode; it's built in. There's also a little setup tool, decals and a sheet of pink packing foam that you can use for receiver padding. The instructions are also worth mentioning; they're clear, comprehensive and easy to understand.

PERFORMANCE

I tested the Dually in my Team Losi Double-X4 with a GM Racing Dr. Speed 11x3 mod motor and a GM Racing Purple Bull stocker. Before installing the Dually, I was running a Novak Tempest Max. With the stock motor in the car and the stock profile dialed into the ESC, I

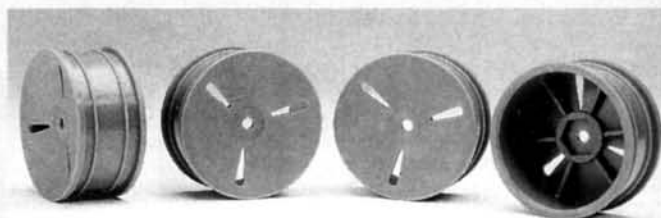
Continued on page 204

Take Off Cap Screw Washers and Anodized Body-Post Clips

Customize your vehicle with these anodized washers and body clips from Take Off*. Available in several colors, they're recessed to fit 3mm cap-head screws and offer a larger mounting surface for extra security. The body clips ... well, they look really cool mounted on your car's body posts. The only problem with having anodized body clips is that you'll be bummed whenever you lose one.

• Washers—TS-104 (add letter to indicate color choice—R/red, P/purple, BK/black, B/blue, G/gold, PK/pink); \$4.95.

• Body clips—TS-403 (add letter to indicate color choice); \$4.95.



Echo 24mm Turbo Wheel

Echo's* dish-style Turbo Wheel features molded-in “teardrops” patterned after a sand dollar. They're available in several colors, come in packs of four and feature zero-offset hubs, which makes them perfect for Tamiya, HPI and other cars that use similar offsets. Their dish design makes them rigid, and they held up well to some hard hits against the track barriers.

• Turbo Wheel—W-1440; \$8.95.

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PRODUCT WATCH

Continued from page 202

noticed a punchier feel when squirting out of turns, along with a less dramatic but still discernible sense of more grunt when accelerating from mid-throttle to full tilt. After checking the specs on the stock profile, I understood why. Novak has programmed the stock setting with greater "minimum drive"—the percentage of full throttle that is applied as the lowest possible throttle position. For stock, minimum drive is 6 percent of full throttle. That explains why the power seems to come on more quickly, but what about the "fatter" feeling throughout the power curve? The stock setting also includes a lower operating frequency (1000Hz, versus 2500Hz with the Tempest Max) that contributes to that all-around punchy feel.

My Tempest Max had a nice, smooth feel with modified power, but the Dually feels even more linear with its modified profile, which ups the frequency to a super-fast 7800Hz. The minimum drive value drops to 3 percent, which helps make the transition from brake or neutral to throttle go a little more smoothly. That's a big help when you have to feed in power gently to avoid spinning the car when exiting turns.

If you feel like experimenting, there's no

Likes

- Useful stock and mod profiles.
- Built-in Schottky diode.
- Excellent instructions.

Dislikes

- Heat sinks may require tweaking for a correct fit.

harm in trying the stock profile with mod motors, and vice versa. For milder mods such as the Trinity Chameleon, the stock profile might be a good choice. For low-wind mods, stock is probably way too punchy. If you don't have a lot of traction, watch out! The mod profile could be good for stock class when the course is very technical. The "flatter" feel of the high frequency mod profile should make the car a little easier to drive. As with any piece of new gear, experimentation is key.

THE VERDICT

The Dually is the latest in a long line of Novak racing ESCs, and it should be as durable and reliable as any orange box that came before it. The dual-profile feature is inspired and just might make the Dually the ultimate club-racer ESC; once you have your chops down in stock, you can move up to mod and dial in the Dually to suit your newfound horsepower. You multi-class competitors can go from stock class to mod (or vice versa) with the same vehicle in about 5 seconds (plus your fastest motor-swap time). That's pretty cool.

Part no.—1660.

Price—\$95.

—Peter Vieira

**Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■*

Continued from page 56

60WT oil and retained the stock gold springs. The only change I made to the rear end was to shorten the wheelbase by installing the hinge-pin spacers behind the rear hub carriers. The car was now on rails. I've used this setup at a couple of other tracks, and it has worked very well.

Associated's decision to go with a shaft drive instead of the more common belt has been hotly debated ever since the car was introduced at the Chicago Hobby Show. In my opinion, the shaft-drive system has a few distinct advantages over drive belts and, quite honestly, I can't think of any disadvantages at all. Over time, drive belts stretch and require belt tensioners to take out the slack that can cause them to skip over the drive pulleys. Dual belt-drive systems also have more rotating mass and operate with more drag because there are pulleys and layshafts to spin, and the belts run across a large surface area. The TC3's drive system is virtually maintenance-free and is lighter and more efficient than a belt drive train.

Interestingly, I didn't really notice any monumental improvements to acceleration or efficiency as a result of the TC3's shaft-drive system until I bolted a slightly worked Trinity* Midnight 2 stock motor onto the motor mount. Whoa! The TC3 shot out like a bullet and carried some serious speed down the back straightaway. The instruction manual recommends that you gear up to a 28-tooth pinion when you run 24-degree ROAR stock motors, but the closest I had to that was a 26-tooth pinion gear. The slightly lower gearing explains why my car accelerated so quickly, but the super-fast top speed had me scratching my head. At that moment, I became a believer; in my experience, the TC3 *does* have an advantage in efficiency over most belt-driven cars; I just hadn't noticed it as much when the car was equipped with a modified motor because there were several faster cars on the track.

FINAL THOUGHTS

I've heard rumors and read postings on various Internet websites that the TC3 torque steers under acceleration and traction rolls without provocation. I'll go on record and state that the TC3 that I built and raced for this "Track Test" did not exhibit either of these traits. My TC3 was dialed in from the get-go, and it has proven to be a rock-solid performer everywhere I have raced it. In my opinion, Team Associated has set a new standard in the highly competitive TC market. The TC3 offers benchmark performance and is extremely easy to build and maintain. It also costs about the same as most of the sport-level imports, and that makes it a genuine RC bargain.

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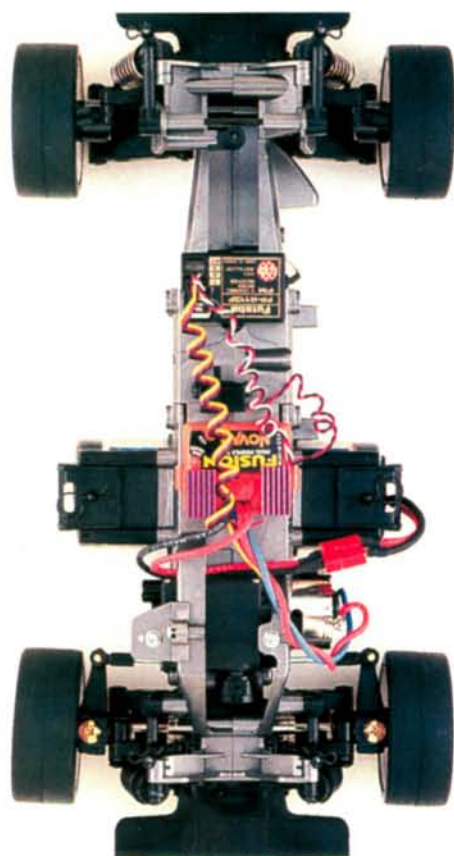
Tamiya Alfa Romeo 156

by Doug Huse

Tamiya's philosophy seems to be "keep it scale," so it's no surprise that the model version of the front-drive Alfa Romeo 156 racing body was mated with the relatively new Tamiya FF02 front-wheel-drive chassis. As is usual with Tamiya products, the instructions are easy to understand, the kit almost goes together by itself, and the bodywork is flawless.



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WIDTH 7.25 in. (184mm)
WHEELBASE 10.19 in. (259mm)
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- Coil-spring friction-type dampers front and rear.
- Double-wishbone suspension with molded, one-piece upper links.



Required Accessories

- 2-channel radio.
- Steering and throttle servo (or electronic speed control).
- 6-cell stick battery pack(s).
- Battery charger.
- Paint.

*Addresses are listed alphabetically in the Index of Manufacturers on page 233. ■

PHOTOS BY WALTER SIDAS

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Chris's BACK LOT

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. My email address is: chrisc@airage.com.

BY CHRIS CHIANELLI

Modeler creativity something you can count on



Don Strump always loved RC cars. In the summer, he would often sit in the driveway and watch his neighbor Buck Bowker run his Bolink Legend up and down the street. Don would love to have joined in, but he's confined to a wheelchair, and his motor skills allow him to do very little other than operate his chair with his right hand. He often chased Buck's car down when it got stuck on the curb, and he'd kick it loose with his foot.

One day, Buck called his stepson Jim Dunlap and asked whether he could help Don out with an RC

old aircraft-type radio to a surface frequency, but having just read about Hitec RCD's new Focus II, single-stick surface radio in *Car Action*, he decided to call; he spoke with Mike Mayberry, who donated the radio, an HS300 servo and SP520 speed control with reverse for the project.

With Mark Baldwin of Step Saver, Jim fabricated a bracket to attach the Focus II radio to Don's wheelchair. Using the radio's two-axis stick, and after a few minor adjustments, including a joystick extension, everything worked out great. Don now steers and throttles the Bolink muscle car shown here (donated by the Dunlap family)—all with his right hand; in fact, his driving is reported to be very good. Rumor has it that he races in Spokane Indoor Raceway's parking-lot program.

Jim considers modelers highly creative and hopes this story will inspire other RC car enthusiasts in a similar way. We at *Car Action* feel the same and encourage anyone with a similar story to let us know about it.

The Dunlap family gives special thanks to Sharon and Buck Bowker, Mike Mayberry (Hitec RCD), Mark Baldwin (Step Saver Inc.) and Kittie at Sears Portrait Studios.

On *RC Car Action's* behalf, I thank Jim, Kim Shaun and Tiffany Dunlap for sending us the letter and photos. ■



setup that would allow him to get off the sidelines and enjoy RC from behind a transmitter. Jim, who is very resourceful and has built many RC projects, enlisted the help of Step Saver Inc., in particular, Mark Baldwin. At first, Jim thought of converting an